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THE RISE OF AN IRON COMMUNITY

AN ECONOMIC HISTORY OF LEBANON COUNTY, PENNSYLVANIA FROM 1740 TO 1865

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TO THE MEMORY OF

MY MOTHER AND FATHER

PREFACE

THE RISE OF AN IRON COMMUNITY attempts to show how a small agricultural section of Pennsylvania developed, in a period of less than a century and a half, into a community in which the iron industry became predominant. The political unit of Lebanon County offers a splendid opportunity for such a study because its economic boundaries coincide, for all practical purposes, with its political boundaries.

Although the people of the Lebanon Valley have maintained their interests and talents in agricultural pursuits, the advent of the industrial revolution in the decade of the 1840's brought many rapid and drastic changes into their entire economy. The study ends with the years of the Civil War, for by that time the pattern for the next half century and more had been set.

In preparing this study the author was especially fortunate in having the assistance of many kind friends and advisers. The late Mrs. B. H. Buckingham, great-grand daughter of Robert Coleman, graciously permitted the unrestricted use of all the Coleman and Cornwall manuscripts then in her possession. Much of this material has since been transferred to the Historical Society of Pennsylvania. The late Mr. Paul Grittinger offered many valuable suggestions based on his research on the Coleman family. Miss Elizabeth M. Weidman, Miss Katherine A. Hoffman, and Mr. Erastus Albert placed at my disposal the use of their own family manuscripts.

Several members of the graduate faculty in history at the University of Pennsylvania were exceedingly kind. The late Professor Herman V. Ames and the late Professor A. E. McKinley did much to stimulate my interest in local history. Professor Roy F. Nichols, in his own inimitable way, encouraged me to make a study of this type. Professor Arthur C. Bining, whose work on the history of the iron industry in Pennsylvania is so well-known, very ably and kindly guided and directed the whole study. He read the manuscript in its entirety, made many valuable comments, and cleared many seemingly insurmountable obstacles.

I should like also to express my very warm appreciation to the members of the library staffs of the University of Pennsylvania, the Historical Society

of Pennsylvania, and Lebanon Valley College, and to the secretaries of the Berks, Lancaster, and Dauphin County historical societies for their helpfulness on many occasions. The late Mr. C. D. Weirich, then secretary of the Lebanon County Historical Society, encouraged the completion of this study in many ways. Several of my students, notably Mrs. Jane Ehrhart Bishop, and Mr. Ralph S. Shay, were of assistance in checking newspaper sources. Miss Gladys M. Fencil, Registrar of Lebanon Valley College, typed the entire manuscript. Dr. George G. Struble, Professor of English at Lebanon Valley College, read the entire study and gave invaluable suggestions for its improvement.

The Lebanon County Historical Society has kindly offered to publish this study. This offer is greatly appreciated. The Editor of the Society gave considerable time in the preparation of the manuscript for publication.

My wife, Marion Stover Miller, showed more than the customary wifely qualities of patience and forbearance which are usually acknowledged in prefaces.

In dedicating this book to the memory of my mother and father, I am acknowledging the greatest debt of all.

To all of these friends and to the many others who were of assistance I wish to express my very deep gratitude. Despite all precautions, errors have probably been made. For all of these I must alone be held responsible.

LEBANON VALLEY COLLEGE — FREDERIC K. MILLER

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A MAP OF LEBANON COUNTY BEFORE THE CIVIL WAR

(TAKEN FROM THE ATLAS OF LEBANON COUNTY 1875)

CHAPTER I

TOPOGRAPHY AND EARLY HISTORY

Justification for a special study of Lebanon County might take many forms. Known politically for many years as the "little star that never sets," because of the unfailing majorities won by the Republican Party in all local, state, and national elections, the county also provides ample evidence, in the way of records available to the historian, of its economic activity and growth from the early settlements down to the Civil War — the time limit of this study. Other reasons to warrant the investigation will be apparent, it is hoped, in the intrinsic richness of the material here presented.

With a quadrilateral-shaped area of 288 square miles, Lebanon County, which includes the beautiful Lebanon Valley,[1] lies in the southeastern part of the Commonwealth of Pennsylvania. It was created by an act of the assembly on February 16, 1813, after having been a township of Lancaster County until 1785 and of Dauphin County until 1813. It lies between Berks and Schuylkill Counties on the east, and Dauphin on the west, and extends from the Blue Mountain or Kittatinny on the north to the South Mountains or the Cornwall Hills on the south.

Lebanon County has been favored by the two natural essentials of good farming — water and good soil. The area is watered by several important streams which not only lend their beauty to the landscape, but also serve to supply the farmer and his fields, to drive grist and sawmills and in the days before the Civil War, served as motive power for furnaces and forges. They were used as the first sources of power by the early settlers, power which they quickly put to work. Among the better-known streams of the county are the Swatara, the Quittapahilla, and the Tulpehocken. The Swatara, a good-sized stream, enters the county in the northeastern section and flows to the southwest. On its course it passes through the center of the county and is a natural boundary line for several of the townships. The Quittapahilla, somewhat smaller than the Swatara, rises in the center of the county close to the present site of the county home, and flows westward until it joins the Swatara at the western end of the county near Bindnagle's church. The Tulpehocken has its sources in the southeastern end of the county just west of

Myerstown and flows eastward eventually to join the schuylkill at Reading.

The surface of this area is for the most part somewhat rolling — excellent for farming — with low lying hills succeeding small valleys in seemingly endless array, dotted with farms and villages and lined with streams of water. Its soil is considered highly fertile. Roughly the valley may be divided into two formations. Across the southern half of the county extends the great limestone formations. This section is comparatively level and due to its foundation of limestone has a superior soil, as is evidenced by its many prosperous farms. In the northern part of the county, and, in most places, separated from the limestone section by the Quittapahilla and Swatara Creeks, the soil is gravelly or clay slate. The surface here is much more broken, and the soil more various, with the result that farming is less productive than to the south, though this section too is not without its highly productive farms.[3] Travelers to the region in the 18th and 19th centuries seldom failed to comment on the scenery of the valleys. In 1850 one of these travelers waxed poetic in his enthusiasm for the "beautiful scenery" and the productive farms nested between the Blue and the South Mountains. At the end of his visit he wrote to the editor of the local newspaper, "the broad luxuriantly producing fields decked in their beautiful and gay robes of summer dress and falling back on majestic hills and towering woods for a base, present to the eye . . . a happy idea of rural happiness and contentment".[4]

Just when the first settler came into this beautiful and fertile area is not known. Trappers and traders likely were the first to interrupt the Indians who lived here.[5] It is possible that a company of Jewish traders, who made a settlement at what later became Schaefferstown, were the first actual settlers. According to rather well-founded tradition, they established a trading post and maintained it long enough to have found it necessary to build a synagogue and to have needed a cemetery. With the coming of the German settlers, who were interested mainly in agriculture, this Jewish settlement disappeared.[6]

Still another group of settlers who came to this section very early in the 18th century, and who, indeed, may have been the first to settle here, were the Scotch-Irish. Sometime prior to 1720 a group of these lovers of the frontier settled in what is now Londonderry Township, Lebanon County. Their

dislike of close supervision and their inability to adjust themselves to the ways of the German farmers who arrived after them, caused most of these Scotch-Irish to move westward into the region of Cumberland and Franklin Counties as early as 1750. The lands on which they had settled were quickly taken up by the incoming Germans.[7]

Among other early immigrants into the Lebanon area were some German families from the colony of New York. They had come to New York from the Palatinate, by way of Holland and England, in the fall of 1710 to settle in the Livingston district on the Hudson, from whence they removed to the Schoharie, west of Albany, in 1714. There they remained until 1723 when, after much difficulty over defective titles to the lands they had occupied, they decided to remove to some vacant lands in Pennsylvania in the vicinity of the Swatara and Tulpehocken Creeks. They travelled overland to the headwaters of the Susquehanna River, rafted down the Susquehanna to the mouth of the Swatara Creek, then by boat up the Swatara a short distance, from which point they went eastward to the fertile lands of the Tulpehocken where a permanent settlement was made. The majority of the settlers took up land which now lies in Berks County, but some of them settled within the present limits of Lebanon County.[8] In the following year, 1724, they sent a petition to the governor of the colony, William Keith, and the council of Pennsylvania, praying that they be permitted to buy the land on which they had settled, "paying the usual Prices for lands at such Distances from Philadelphia". They also stated in this petition that fifty more families were anxious to settle with them, provided suitable arrangements with respect to land titles would be made.[9] So it was that in 1728 and 1729 more of these Palatinates came into this section to settle and to farm the fertile land they found awaiting them. Meanwhile and possibly prior to their coming, other settlers were coming to the area singly and in groups. Some came over the Cornwall Hills from the southern end of Lancaster County and some from the eastern part of the colony,[10] pushing ever westward so that what in 1724 had been called "the farthest inhabited part of the Province northwest of Philadelphia"[11] was by 1750 a township of 120 taxables; and by 1755, 185 taxables.[12] The names of some of these early settlers are interesting in that they were the forefathers of those who later were to become leaders of the several communities in Lebanon County. Some of the more prominent of these names were Licht (Light); Weiser; Heilman; Boyer; Long; Orth;

Reynolds; Steitz; Cucher; Stover; Weidman; Klein; Kreider; Schaeffer; Stump; Miley and Meyers.[13]

Prior to 1732 the Indians held nominal title to all other lands included in Lebanon County. But in that year on September 7, owing largely to the expressed desire of the settlers to have legal titles, the lands between the Delaware and the Susquehanna south of the Blue Mountains not previously purchased were bought by the Proprietors.[14] This purchase included all of the present county of Lebanon, and from then on legal title as well as actual possession belonged to the settlers.[15]

NOTES

1. The term "The Garden Spot of Pennsylvania", which is sometimes applied to Lebanon County, is a much disputed one. Both Lancaster and Lebanon Counties have laid claim to it.
2. The other streams of the county which are known for their economic importance in the first half of the nineteenth century, and which still attract hikers and fishermen, are: Indian Town Creek, Conewago Creek, Hammer Creek, and Cat-Tail Run.
3. Miller, B. L., *Limestones of Pennsylvania*, 132; Alex Graydon to Jedediah Morse, March 5, 1789, in *Penna. Mag. of Hist.*, VI, 115; Trego, C. B., *Geography of Pennsylvania*, 274; Gordon, T. F., *Gazeteer of Pennsylvania*, 26-27, Pt. II, 237.
4. *Lebanon Courier*, July 26, 1850, Letter to the Editor; Bartram, *Observations*, 11.
5. The history of the Indians in Lebanon County still waits adequate treatment. Before the entrance of the settlers, however, the Lebanon Valley was a happy hunting ground for several tribes. It is known that along the Swatara lived members of the Susquehanna tribe. Though they were driven out before the arrival of the settlers by the Shawanese, most of the Indian relics of Lebanon County are of Susquehanna origin. Egle, *History of the Counties of Dauphin and Lebanon in the Commonwealth of Pennsylvania*, 3-5.
6. Krall, J. M., Colonial Events: Eastern Pennsylvania and Schaefferstown, in Lebanon County Historical Society *Papers*, II, 104-109. Krall dates the coming of these Jewish traders to Schaefferstown about 1694. He states that on a visit to the cemetery in 1869, he found it in "perfect preservation", and that it remained intact until 1877 when it was torn down. The trading settlement itself, he says, remained until 1730. See also Zerbe, C. M., Annals of Schaefferstown, in Lebanon County Historical Society *Papers*, IV, No. 10, (1908); Hirsh, Early Jewish Colony, in Lancaster County Historical Society *Papers*, V, No. 5, 91-105.
7. Rupp, I. Daniel, *History of the Counties of Berks and Lebanon*, 302, 332; Mays, George, The Palatine and Scotch-Irish Settlers of Lebanon County, in Lebanon County Historical Society *Papers*, I, No. 5, (1900); Learned, M.D., The Pennsylvania-German and His English and Scotch-Irish Neighbors, in Lebanon County Historical Society *Papers*, II, No. 11, (1903).
8. There are several reliable accounts of this journey of the Palatinate Germans. See especially, Rupp, *op. cit.*, 90-99, 188-193, 245-247, 302-309. Rupp, I. D., 30,000 *Immigrants*, 5. For the story of the Palatines at Newburgh and their exodus, see *Olde Ulster*, III, No. 3-8, (1907).
9. *Colonial Records*, III, 341-342.
10. Egle, *op cit.*, 5. "The earliest assessment extant of taxable which included this county is that of Conestoga township, Chester County, for the year 1718. Among the names we recognize a number which a few years after appear on the tax-list of Lebanon Township, and more especially among the first warantees of land".
11. *Colonial Records*, III, 341.
12. Rupp, *op. cit.*, 307-309.
13. Tax-lists, see Rupp, *op. cit.*, 306-309.
14. Egle, *op. cit.*, 4-5.
15. This purchase did not, however, permanently dispose of the "Indian Problem". During the French and Indian War the settlements of the county were raided frequently, many of the settlers lost their lives, and a considerable amount of property was destroyed. After 1763 the danger of Indian attack was removed. Rupp, *op. cit.*, Chapter III; Richards, H. M. M., Lebanon County in the French and Indian War, in Lebanon County Historical Society *Papers*, II, No. 2, (1901).

CHAPTER II

THE PEOPLE

After the settlements in the Lebanon Valley had been started, there was such promise of success that scores of other settlers, attracted by the fine prospects here presented, soon came into the area with the purpose of making it their permanent home. Many of them were brought to the Valley by the excellent conditions for farming. Others among them, especially Germans, thought they saw in the mountains, streams, and valleys a "pocket edition" of their homeland. This would naturally give them such an "at home" feeling that they were easily persuaded to locate in this vicinity. Others came to the Valley directly from Europe upon the recommendation of relatives who preceded them here and who wrote encouraging reports on the fertile farm lands and prospects for tradesmen and skilled craftsmen. Still others drifted in from the eastern parts of the colony to carry on their trade or craft in the small but progressive industries which were erected shortly after the first settlements were begun.

In 1729, when the county of Lancaster was created, one of its townships was named Quittapahilla, subsequently changed to Lebanon Township. This political subdivision included all of the area which later was embraced in the county of Lebanon.[1] The growth of population in this area — as a township and as a county — is an excellent index of its economic activity. As will be noted later, it was during the years when population grew rapidly that the county also experienced its greatest agricultural and industrial growth prior to the Civil War.

While admitting the difficulties accompanying the use of tax-lists in estimating population, they do offer a method whereby an indication of population figures can be given. According to the earliest assessment lists available, there were 120 taxables in the township in 1750. By 1780 this number had increased to 457 taxables.[2] Since these lists include, of course, only the holders of taxable property; because many land owners avoided paying taxes; and owing to the changes made in the tax laws after Independence, it is certain that these figures must be used cautiously. They are indicative, however, of the *growth* of population in Lebanon Township in the thirty

years, 1750-1780. It should also be mentioned that in 1739 Bethel Township was created from the northern section of Lebanon Township, and in 1757 Heidelberg Township was established and included a small part of the area previously designated as Lebanon Township. In 1806, Scott, in his *Geographical Description of Pennsylvania,* estimated the total population of Lebanon Township, after 1785 a part of Dauphin County, at 2870 free persons and eight slaves.[3] This is one of the earliest reliable figures of population to be found.

After some twenty years of agitation, and despite many protests from the several counties involved, the County of Lebanon was established by the State Legislature in February, 1813.[4] Both Dauphin and Lancaster Counties gave up sections of their jurisdictions to the new county. It was composed of the following townships: Heidelberg, Lebanon, Londonderry, Annville, East Hanover, and Bethel.[5]

It is in the Fourth Census, then, that accurate population figures for the county can be found for the first time. In the year the Fourth Census was taken, 1820, the total population of the county was given as 16,975.[6] Included in this total were 103 free colored persons, and four slaves. In 1830, the total population of the county had risen to 20,557, including 132 aliens, eighty-four free colored persons and five slaves, four female and one male.[7] This was an increase of 3,582 persons, or 17%. Much of the increase was caused, likely, by the advantages which resulted from the completion of the Union Canal. Many of the laborers and engineers who worked on that project remained, with their families, after it was open for navigation, and became permanent residents of the county. Then, too, the demands which the operation of the new "ditch" made upon the materials and people of the county were supplied by teamsters, boatmen, lock tenders, repairmen, laborers, and miscellaneous workers. There were, for example, within the boundaries of Lebanon County, sixteen locks, a large pumping station, a water conduit about eight miles in length, which because it was partly constructed of wood required frequent and extensive repairs; also there were four large water dams, two large storage and exchange basins, bridges and administrative buildings to be maintained. All these required persons to operate and repair. Most of these workmen, together with their families, took up their residence near the place of their employment. They in turn called for still other people

to come into the communities along the canal to establish additional services such as stores, mills, shops, and warehouses. Thus this influx of persons needed for the operation and maintenance of the Union Canal accounts, in part at least, for the rise in population.

During the next decade, 1830-1840, the population of the county remained practically stationary, for by the Sixth Census, 1840, the total population was only 21,872, including 103 free colored persons. For the first time in its history, the county did not number any slaves in its population.[8] Out of this total number 21,872, there were 2,205 persons engaged in agriculture, and 4,324 engaged in manufacturing and trade.[9]

The decade of the thirties was succeeded, however, by two successive decades in which there were notable increases in population. By 1850, the number of persons living in the county had grown to 26,071, an increase of 16%.[10] This number included 86 colored persons, all free. In the ten years 1850-1860, the population of the county advanced 17%, the total population, according to the Eighth Census, being 31,833.[11] Of this total number, 85 were free colored persons. It was in these two decades, 1840-1860, as will be noted later, that the industrial revolution really took hold in the county and which provided more opportunity for workers and men of capital. "Steam mills" took the place of mills driven by water power, furnaces began to use steam power, anthracite coal supplanted charcoal as fuel for the latter, the construction of railroads was begun, all of which required labor, which in turn caused this rapid growth in population. Not again until 1890 was the Census to record such gains in population figures, and then the record was to be even better. The population of 1890 was 48,131 as against 38,476 in 1880, or a gain of more than 20%.[12]

Many of the settlers who first came into this region were farmers, hence tended to establish themselves on their own tracts of land. Land speculators, as well as those sincerely interested in developing this section, however, soon began to purchase large tracts of land with the expectation of re-selling the land in lots to found towns.[13]

Several influences aided these men in their efforts to establish towns. Among the continued influx of settlers were included artisans of all sorts

and descriptions — carpenters, stone-masons, millers, brewers, tanners, bakers, butchers, etc. — many of whom were anxious to work at their trade, hence would welcome a settled community. Also, the need for protection against recurring Indian raids forced the settlers to give consideration to consolidate some of their settlements. As time passed, and a stage route was established between Harrisburg and Reading through Steitztown (Lebanon), stopping places for the convenience of both passengers and horses induced, so tradition says, the location of towns at intervals of approximately five miles. This would account, in part at least, for the location of Myerstown, Annville, and Palmyra.

In the colonial era, and in the 19th century, as well, Steitztown, later known as Lebanon, was the center of trade and industry. There is considerable doubt as to the exact date of the founding of this settlement. Proud says it was laid out about 1759.[14] Rev. George Lochman, writing in 1812, said the town was laid out in 1756.[15] On the other hand, George Steitz (also spelled Stites and Stuyts) was granted 313 acres of land on December 19, 1737, and an additional 52 acres in March 17, 1740, both grants being confirmed on May 2, 1753.[16] In 1738, John Ligha (Licht) purchased several hundred acres of land from Caspar Wistar, the southern boundary of the tract being given as "South by George Steitz's settlement."[17] These deeds would seem to fix the date of the first settlement of Lebanon prior to 1740. It may also be true that the confusion which has existed concerning the date of beginning has been due to the use of such terms as "laid out", and "sale of lots", etc. It is likely that Steitz sold plots of land on his grant before he actually "laid out" the town in lots, thus leading to some confusion as to the real date of beginning. However that may be, the writer is inclined to believe that Steitztown was founded shortly after Steitz purchased the land, that is, before 1740.

All of the deeds subsequently granted by him show his desire to build a town that would endure. In order to discourage speculators, and doubtlessly, in order to attract other buyers, he stipulated in his deeds, that the purchaser was to erect, within eighteen months after the purchase of the lot, "one substantial Dwelling-house, of the Dimensions of Sixteen Feet Square at the least, with a good chimney of Brick or Stone, to be lain in or built with Lime and Sand".[18]

In 1740 Francis Reynolds took out a warrant for a tract of land adjoining that of Steitz on the west, and immediately laid out part of this tract in building lots. Reynolds died in 1744 or 1745, leaving this tract of land to his son, George, who was married to Eleanor, daughter of George Steitz. This in a sense united the interests of Steitz and Reynolds for a time, especially after a daughter, Catherine, was born to George and Eleanor Reynolds. However, by the terms of Steitz' will, on his death in October, 1767, only a part of the Steitz tracts passed into the hands of his grand-daughter.[19] As will be noted, she received none of the Reynolds tracts.

Before his death in 1762, George Reynolds became considerably indebted to one Daniel Benezet, and found it impossible to repay his loans. Benezet brought suit against Reynolds in the Court of Common Pleas at Lancaster in May, 1762. The Court found against Reynolds and directed the Sheriff to sell all of the lands in the Reynolds' tracts except those lots which had been sold by Reynolds. Accordingly, the Sheriff conducted the sale on June 27, 1763. A land company, composed of men from Lebanon Township, was formed to purchase the land. All were men who were interested in maintaining the settlement of Lebanon as can be observed by their occupations. The company was composed of the following: Reverend John Caspar Stover and Mary Catherine, his wife; Christopher Wegman, innholder, and Eva Maria, his wife; Philip Greenawalt, innholder, and Margarethe, his wife; Caspar Schnebele, shopkeeper, and Sabina, his wife; George Hack, tanner, and Sophia, his wife; Christian Gish, blacksmith, and Sophia, his wife; and John Ulrick Schnebele, joiner, and Eva, his wife. The sum paid for the Reynolds' tracts was three thousand pounds, "lawful money of Pennsylvania". The holdings of the company were divided into eight equal shares; Rev. John Caspar Stover received "Two full equal & undivided eighth parts" and each of the other members received one full eighth part.[20] This land company immediately became active in selling lots in the town.

George Steitz, up to the time of his death in 1767, was largely responsible for the development of the town. From the beginning and until late in the eighteenth century the town was called "Steitza" or Steitztown. It was as early as 1758, however, that the name was officially changed to "Lebanon". A study of the deeds issued by Steitz reveals the use of "Steitztown" until June 24, 1758. On that date Steitz issued a deed to Pete Slauser on which

the name "Steitztown" was crossed out and the word "Lebanon" was written in. All subsequent deeds issued by him bear the name "Lebanon", as do those later issued by Stover's land company.

Dr. B. W. Schmauk in his researches on the origins of Lebanon came to the conclusion that it was the intention of Steitz to lay out a town extending five blocks north and south and five blocks east and west, centering in Market Square at what is now Ninth and Cumberland Streets.[21] This conclusion is substantiated by the "Draught of Lebanon, Pa. of 1788" on which is shown two streets to the east and two streets to the west of Market (now Ninth) Street, and two streets to the north and two to the south of Cumberland Street. In the same year, 1788, the town of Lebanon was visited by John Penn, the eldest son of Thomas Penn. Referring to his visit, he wrote in his *Journal*, "After riding through a village (Myerstown), I came to Lebanon, a handsome town containing some hundred inhabitants. This place is decorated by a spire, and the houses are well built; many of them stone or brick".[22]

The population of the town grew slowly during the first century of its existence. In 1772, according to Proud, there were about two hundred houses in the town.[23] The first accurate indication of the size of the town may be obtained from the reports of the First Census, 1790.[24] In that year the town of Lebanon was listed as containing 943 inhabitants. In 1794, Cazenove, who was a very careful observer, noted 170 houses.[25] In 1820, the town numbered 1,489,[26] and from this figure the population grew very slowly until 1850, when there were 2,184 persons living in Lebanon.[27] Included in this letter figure were only nine negroes. During these several decades the town figuratively slept. Not only was there a very small increase of population, but there was also a definite lack of interest in the industrial, commercial, and transportation developments that were going on in the other parts of the country. Not even the Union Canal, which was opened to navigation in 1827, seems to have stirred the Lebanonians to action, though it must be noticed that the chief beneficiary of that project was North Lebanon Borough, which was located on the canal, about one-half mile to the north of Lebanon Borough. The population of North Lebanon Borough greatly increased in the years when activity on the canal was at its height. Starting from a small settlement located on what was at one time the farm of John Light, it, too, grew slowly until the thirties and forties. In 1840, the Borough had a population of 1,430,

and during the next ten years this number rose to 2,408.[28] After the completion of the Lebanon Valley Railroad in 1858, the two Boroughs came to be separated by only a street, and consolidation seemed to be in order. By an act of the Legislature, April 4, 1868, North Lebanon Borough was annexed to Lebanon Borough.[29]

In the meantime, the Borough of Lebanon was not left to sleep in peace. The several editors, many visitors, and some of the more active citizens were constantly challenging the people to "Wake up!". On November 18, 1846, the *Courier* carried an editorial which is typical of many others on the same subject. The editorial mentions the progressive nature of Reading and Pottsville and then asks, "and where is Lebanon — 'gallant little Lebanon' — all this while?. . . With shame and confusion of face we acknowledge that our worthy citizens have not yet awoke from the blessed sleep in which they have been buried alive the last twenty years! . . . Our citizens have not enough of what may be called a *home pride!*" The editorial is concluded by a plea to the townspeople to "get to work".[30] In the same vein, a Lancaster correspondent wrote to the editor on February 2, 1846, "Languishing for years in a sort of dreamy terper, [*sic*] and . . . gorged to the fill with the bitter sweets of apathy and inaction, your worthy citizens have grown insensible to the spirit of Progress abroad in every direction of the country".[31] However, these urgings and warnings went, for the most part, unheeded. The town slept on, satisfied to remain much as it had been at the beginning of the nineteenth century.

During the decades of the fifties and sixties, however, the borough came alive. An increasing interest was shown in the economic developments in the surrounding counties. The above-mentioned editorials and letters, likewise, stirred some of the citizens to action. As a result, many new industries were started, several railroads were built which passed through the town to give it outside contacts, houses were built, and as a result, population grew rapidly. From 2184, in 1850, population rose to 4449 in 1860 and to 6727 in 1870.[32]

The signs of this new life in the town were in evidence in 1853, as is to be seen in the following letter written by a "stranger" who visited Lebanon in August. Lebanon was, he wrote, "a pleasant, friendly town; old enough to be interesting and new enough to be comfortable . . . . the fruitful valley surrounding it — the furnaces perched upon the neighboring hills — its plank road, which tells of enterprise and gives a city air to the town . . .

these and the intelligence of the city delights [*sic*] me much".[33]

Further evidence that the town of Lebanon was becoming more alert to the changes taking place in the world can be seen in the following. In December, 1857, a telegraph line was opened through Lebanon. This line was built by the Lebanon Valley Railroad and was built only after the failure of several private attempts to secure a charter for a telegraph company.[34] In 1865, a telegraph line was erected from Lebanon to Cornwall along the route of the North Lebanon Railroad.[35]

Another indication of the decreasing provincialism of Lebanon is to be found in the circulation of Philadelphia newspapers in the town. In 1858, well over three hundred families were receiving metropolitan papers. The *Ledger* and *Forney's Press* were read by 170 and 93 residents respectively, while the *Daily News*, the *North American*, and the *Bulletin* also had subscribers.[36]

Such, then, in brief, was the development of the town of Lebanon. In a little more than a century, it had grown from a small settlement to a town containing well over six thousand inhabitants. From an agricultural village it developed into an industrial town, dependent, to be sure, primarily on the iron industry, but nevertheless giving definite indications of having become an urban center.

Lebanon and North Lebanon were the only towns in the county to have any important growth and development in the years before the Civil War. Annville, Palmyra, Myerstown, Fredericksburg, Schaefferstown, and Jonestown remained small. They did not participate in the industrial and commercial expansion which was experienced by Lebanon. This was due, largely, to the inability of these towns to take advantage of the development of the iron industry, which Lebanon, owing to its strategic location and to the efforts of such families as the Colemans, was able to take. For example, in ten years, 1850-1860, the population of Palmyra was increased by only 49, from 286 to 335; that of Myerstown by 147, from 887 to 1034.[37]

The area of the Lebanon Valley has been known for many years as the region of the "Pennsylvania Dutch" or "Pennsylvania German". The name has been given to it because the large majority of the residents of the Valley

were of German extraction. As has been noted above, as late as 1870, out of a total of 34,096 population in Lebanon County, 33,341 were native born, and the large majority of them were "Pennsylvania-German". Of the 755 who were foreign-born, 442 were born in Germany.[38] For many years mention of this section would bring a smile to the hearer, for immediately the peculiar inflection and the dialect used by the "Pennsylvania Dutch" would be recalled. Everything from crops to storms was "wonderful", and lights were "outened" not "extinguished".[39] More recently, however, more attention has been given to the "antiques" of these people. Stiegel glass, Gaudy Dutch plates, furniture of all kinds, "Cornwall Stoves", etc., all of which were once common household articles in the Valley, are now the delightful "finds" of antique dealers and collectors. Articles and books have been written which portray the sturdy and individualistic nature of these people and their peculiar traditions and customs.[40]

From the beginning the German settlers, including those of the Lebanon area, were at once a problem and a benefit to the province and later the state. Concerning the early settlers in Lebanon Township it has been said that "Individual thought and action overshadowed all other interests, and reveling in the freedom that [they] had at last attained, each one appears to have been determined to exercise his liberty to the fullest extent".[41] Many times they were severely criticized for this independent spirit. On several occasions William Penn was led to write to James Logan on the question of the intense desire for land manifested by the Germans. In a letter written in 1706, he said, "The Germans incline most to have the Susquehanna lands, and will give more for them here in ready money than what's proposed there".[42]

But with all the difficulties they may have caused the proprietors and their disgruntled Secretary, these German settlers were honest, hard working, industrious and skilled farmers and craftsmen. Governor Thomas, writing in 1738, said, "This province has for some years been the asylum of the distressed Protestants of the Palatinates and other parts of Germany, and I believe that it may be truthfully said that the present flourishing condition of the Province is, in a great measure, owing to the industry of these people—it is not altogether the goodness of the soil but the number and industry of the people that make a flourishing colony".[43] Travellers, too, attest to the industry of the people living in the German townships of eastern Pennsylvania. One

such wrote in 1799, "All Germans; — the most early rising, hard working people I ever saw . . .".[44] As a result of this combination of good soil, excellent climate, and a willingness to work hard, Pennsylvania soon outranked all other colonies in agricultural production, and developed skilled craftsmen whose productions were widely praised. During the nineteenth and twentieth centuries, the German farmers of Lebanon County did not lose any of their virtues. Their farms are still admired by all who see them, and they stand second to none in the skill with which they manage their farms. Machinery and electric power have practically eliminated the old-time craftsmen, but the work of these men has outlived them in the homes of their descendants. Truly they built well.

Little need be said of the other groups who came to settle in Lebanon County. Attention has already been directed to the Scotch-Irish who settled in what was to be Londonderry Township. In 1733 these Scotch-Irish settlers began their migration into the Cumberland Valley, using the ferry of John Harris. After this migration had run its course there were only a comparatively few Scotch-Irish left in the Lebanon Valley.[45] A few French Hugenots came to the Lebanon Valley in the colonial era, but not in important numbers. Several of them did become noteworthy in the early history of the county. General John Philip de Haas was probably outstanding among them.[46]

Slavery never became an important problem in Lebanon County. The number of slaves owned by citizens of the township and county was never large enough to become economically important. Nor, for that matter, did the number of free negroes in the county ever create any serious problems. In 1779, according to the tax-list of that year, there were ten slaves living in Lebanon Township, eight of whom were owned by Curtis Grubb of Cornwall Furnace; John Philip de Haas and Adam Orth owned one slave each. In Heidelberg Township, Thomas Bossler, Peter Shitz and Philip Wolfsperger owned one slave each.[47] In the next year, 1780, the General Assembly passed "An Act for the Gradual Abolition of Slavery". This act provided "That all Persons as well negroes and mulattoes as others who shall be born within this state from and after the passing of this act, shall not be deemed and considered as servants for life or slaves . . .".[48] Provision was also made for the registration of the slaves then held in the state, and no negro or

mulatto could be held as a slave unless he or she was so registered. In the registration book of Lancaster County, John Bossler of Heidelberg Township listed one slave; Robert Patton, of Lebanon Township, three slaves, two of whom were children; Curtis Grubb, of Lebanon Township, twenty-four slaves, including seven children and one "runaway"; Adam Orth, of Lebanon Township, one slave; and Christopher Kucher, of Lebanon Township, one slave.[49] It is interesting to observe that of these men who owned slaves in 1780, only one is listed as a farmer, Adam Orth. The others were merchants or millers, or in the case of Curtis Grubb, an iron-master. From 1780 on, then, the number of slaves held in Lebanon County continued to decrease until, finally, by 1840, the few who were registered had died or had been set free by their owners.[50]

The farmers of the county had not only religious scruples against slavery, they also had found no need to use slave labor. As will be noticed later, their farms were never large enough to warrant the purchase of a slave, even though they might have had enough money for that purpose.

Free negroes were never very numerous in the county. They were used for the most part for rough unskilled labor or for domestic service. In the half-century after 1820, the number of negroes living in the county actually declined. In 1820 there were 103 negroes listed in the census reports and by 1870 there were only 74.[51] In the Borough of Lebanon, where many of them lived, they gathered together in one section of the town, a section which was called "Texas". An occasional "fight", however, was the only notice given to the negroes by the town newspapers.[52]

Indentured servants, like slaves, were seldom used in the Lebanon area. For example, in 1771, there were only seven servants indentured to the residents of Lebanon Township, and only four in Heidelberg Township.[53] In 1773, the number of servants in Lebanon Township rose to nineteen, and in Heidelberg Township, the number increased to seven.[54] By 1782, the last year for which fairly accurate figures have been found, each of these townships listed three servants.[55]

One other group of citizens of the county needs to be mentioned—the Irish. Some of these "better citizens", as the editor of the *Courier* sarcastically called them, came to the county during the building of the Union

Canal in the twenties; but most of them were brought in to build the railroads in the fifties. They did not prove to be very peaceful citizens as can be seen by the frequent disparaging remarks concerning them made by the editor of the *Courier*. Numerous "fights" were reported among them, many of them resulting in jail sentences for the belligerents. In announcing that one of these fighters had broken out of jail, the editor commented that he had been committed for "spoiling the profile of an antagonist".[56] In the decade of the fifties, the high-water mark of their pugnacity came on Christmas Day of 1857. On that day of peace and good will, they gave the citizens of Lebanon a "stirring time". "These 'better citizens', who never feel so happy as when using the shellaleh or fists upon each others' craniums, went it with a rush, in so many parts of the town that the 'sightseers' were not able to keep up with the 'bouts'. Quite a number of them landed in jail, where they continued their pugnacity until they were very generally 'pugged'."[57] Many of these Irishmen and their families left the community after the railroads were built. Those that remained soon adapted themselves to the more peaceful Germans, and became excellent citizens.

In conclusion, Lebanon County experienced, along with the other eastern counties of Pennsylvania, an exodus of population to the West, especially after 1850. Although some families were constantly leaving the Lebanon area for the frontier before the Revolution, and others left in the first half of the nineteenth century,[58] it was not until the discovery of gold in California that the emigration became serious. Mr. Levi Kline, one of Lebanon's prominent lawyers, perhaps illustrated the average reaction to the first reports of the "gold rush" when he wrote to Adam Grittinger in 1849. "We have nothing new here excepting that the Gold fever has seized upon some of our citizens and some even talk of going Gold hunting in California but I presume it will all end in talk."[59] The migration was by no means restricted to any one township in the county, nor to any particular age group; nor was it limited to the less prosperous citizens of the community. Unmarried men, men with families, farmers, mechanics, and business men were all attracted to the west.[60] While a majority of them went to dig gold in California in the early fifties, the later emigrants went, in an increasing proportion, to the states and territiories of the mid-West, there to carry on farming or trade.

In the early fifties, it was the custom for unmarried young men to form

companies before leaving for the West. In September, 1850, for example, the following advertisement appeared in the *Courier*. "Ho! for California. All persons desirous of going to California, are requested to attend a meeting, at the public house of the widow Rise, in the Borough of Lebanon, on *Monday evening, September 30th*, then and there to form themselves into a company for the purpose of gold-digging in California. N.B. None but sound healthy men will be accepted."[61]

The total number of those who left Lebanon is impossible to estimate. Groups numbering as many as forty persons from one township left in the fifties.[62] At times those who desired to leave found that the rush was so great that for several months they could not secure tickets on the boats leaving New York.[63] In spite of its obvious exaggeration, a statement made to the editor of the *Courier* by a gentleman who had been travelling in the West is indicative of the extent to which the emigration had gone. "You can scarcely go", he said, "to any portion of that section of our country where you will not meet Lebanon County people."[64] In the next decade the exodus continued, causing the *Courier* to sound a note of warning. "The hegira from Lebanon this spring is very great and our population is decreasing rapidly. The perfect stagnation of business here offers no inducements to retain the industrious. We trust, however, that this condition is not to last long."[65]

Eventually, of course, the desire to move to the west waned. Especially was this true after some of those who had emigrated earlier began to return to Lebanon and expressed their dissatisfaction with, and disappointment in the conditions they had found in the West. A group of persons who left Campbelltown to go to Michigan in the early fifties returned in December 1855, "with the Western fever down to zero".[66]

The emigration had taken out of the county many of the farmers and many of the workers. That the population during the decade did not decline, in spite of this exodus, was due, almost entirely, to the fact that it was in this decade that industries in Lebanon began to expand and thereby created a need for more workmen. Thus the vacuum that was created by the westward movement of population was rapidly filled by those who came to work in the new furnaces, mills, and shops. This gave to the county a greater population in 1860 than it had in 1850.

NOTES

1. Egle, *op. cit.*, 128-129.
   The origin of the name "Lebanon" has been the cause for much research. Nothing definite can be found in the records to indicate reasons for the selection of this name. A plausible explanation which is rather generally accepted is that since the early Germans in this Valley were largely of the pietistic sects, they desired a Biblical name for their home rather than the Indian term Quittapahilla. Grumbine, Lee L., The Origin and Significance of Our Township Names, in Lebanon County Historical Society *Papers*, I, 127.
2. These tax-lists are printed in Egle, *op. cit.*, 129-133.
3. Page 104. In 1799, the township of Annville was erected out of Lebanon Township.
4. *Laws of the Commonwealth of Pennsylvania*, VI, (1822), 17-21. As early as March, 1810, the matter of creating a new county had received a favorable report from a committee of the House of Representatives. The committee reported, "That they have attentively examined the boundaries proposed for the new county aforesaid, as well as the tract of country which would be included within them and they find that it is fertile, populous, wealthy and eminently entitled to the privilege and honor of being a separate county". See the Lancaster *Journal*, March 24, 1810.
5. *A Map of Dauphin and Lebanon Counties*, by Thomas Smith.
6. *Ninth Census*, (1870), I, 58-59.
7. *House Executive Documents*, No. 263, 22:1, Vol. VI. See also Hazard, *Register of Pennsylvania*, VII, 252-253; Gordon, *op. cit.*, part II, 238.
8. *Executive Document*, No. 76, 27:2 (1841-42).
9. Lebanon County Historical Society *Papers*, II, 328.
10. *Ninth Census*, (1870), I, 251.
11. *Ibid.*, I, 251.
12. Population of Lebanon County 1870-1920:

1870	34,096	an increase of	6%	over 1860.
1880	38,476	an increase of	11%	over 1870.
1890	48,131	an increase of	20%	over 1880.
1900	53,827	an increase of	10%	over 1890.
1910	59,565	an increase of	9%	over 1900.
1920	63,152	an increase of	5%	over 1910.

   The Pennsylvania Manual, (1929), 444.
13. See, for example, Miss Olive S. Kreider, The Development of East Lebanon from the Kucher, Gloninger and Krause Farms, in Lebanon County Historical Society *Papers*, XI, No. 4, (1938); Miscellaneous collection of deeds, Lebanon County Historical Society, especially those of Abraham Rex and Alexander Schaeffer.
14. Proud, Robert, *The History of Pennsylvania*, II, 284.
15. *Evangelical Magazine*, I, 20, (1812).
16. Attested copies of these deeds are in the files of the Lebanon County Historical Society.
17. Rupp, *op. cit.*, 304.
18. This provision is found in all of the deeds issued by Steitz; see, for example, the deed issued to George Ruksecker for lot number 167, issued May 10, 1760. Lebanon County Historical Society.
19. The WILL of George Steitz, Lebanon County Historical Society. There has been found no evidence which would prove the assertion sometimes made that after the death of George Reynolds, "most of the Reynolds' lots, if not his entire farm, it is probable had previously fallen into the possession of George Steitz . . .". Egle, *op. cit.*, 133.
20. Deed of Christian Gish and Wife to Jacob Focht, Brewer, May 13, 1766. Lebanon County Historical Society.
21. Schmauk Mss., Lebanon County Historical Society.

22. John Penn's Journal — A Trip to Reading, Harrisburg, Carlisle, Lancaster in 1788, in *Pennsylvania Magazine of History and Biography*, III, 290. In 1794, Cazenove called Lebanon, "a little town, quite pleasant", *Journal*, 1794, 46.
23. Proud, *op. cit.*, II, 284. In the *Pennsylvania Gazette*, May 19, 1773, appeared an advertisement for a "physician of good character" to come to Lebanon, a town then containing "250 families". This advertisement also appeared in the *Pennsylvanische Staatsbote*, May 25, 1773.
Manasseh Cutler, of Ohio Company fame, visited Lebanon in August, 1788. He wrote of the town, "This place is as large, nearly, as Reading, and is laid out in squares — Dutch buildings; some considerably elegant, mostly of stone. A market near the tavern where we dined . . .". Cutler, William P., and Julia P. Cutler, *Life, Journals, and Correspondence of Rev. Manasseh Cutler*. August 2, 1788, I, 399.
24. *Heads of Families at the First Census of the United States Taken in the Year 1790, Pennsylvania*. Washington — Government Printing Office, 1908, p. 9.
25. Cazenove, *Journal*, 1794, 48.
26. Breslin, William M., A History of Lebanon County Prior to 1876, in Lebanon County Historical Society *Papers*, VI, 133-134; Gordon, *op. cit.*, part II, 239.
27. *Ninth Census*, (1870), I, 251.
28. *Lebanon Advertiser*, September 18, 1850; *Ninth Census*, (1870), I, 251. In 1847, Editor Worth wrote, "We are pleased to see the evidences of prosperity which are now being displayed in this thriving little village. We notice several buildings going up, and from the busy stir, we have no doubt that several more will be commenced before fall. Unless the good people of the Borough bestir themselves, they will soon be distanced by their more persevering neighbors." *Lebanon Courier*, May 8, 1847.
29. *Laws of the General Assembly of the State of Pennsylvania Passed at the Session of* 1868, 642-645.
30. Other editorials of a similar nature may be found in the following issues of the *Courier*, November 12, 1845; April 10, 1847. This lack of interest and activity in Lebanon extended, apparently, even to the traditionally important Fourth of July celebration. One correspondent, noting this inactivity, wrote to the editor on July 1, 1846, "For once, then, Fellow-Citizens, shake off the dew drops of apethetic inaction".
31. *Lebanon Courier*, February 11, 1846. A visitor to the town in 1850 after paying compliments to the state of development in agriculture, complained about the slow stage lines. "I have travelled considerably in this way [by stage] in my time, and I must say never saw such apparently *humane drivers*, as are on the Lebanon route". He observed that the horses were strong and had a good appearance, but they "mope along" at such a slow pace that he was tempted to get out and walk. *Ibid.*, July 26, 1850.
32. *Ninth Census*, (1870), I, 251.
33. *Lebanon Courier*, August 19, 1853.
A Philadelphia editor in 1857 also commented on the increased population that was to be noticed in the town. "Lebanon, Pa., has not until very lately had the advantage of railway facilities. It was located upon no main route of trade or travel. In 1850 it had only 2,184 inhabitants and under the circumstances it could not be expected to have increased much since. But a census which has just been taken shows its population to have reached 5,452, of whom 2,858 are males and 2,594 females. From this it would appear that there are now more males by 674 in Lebanon than the whole population amounted to in 1850." *North American and United States Gazette*. Philadelphia, September 11, 1857.
34. *Lebanon Courier*, December 18, 1857. The progress made in the construction of this line can be followed in *ibid.*, June 9, 1854; January 2, 1857; March 27, 1857; October 2 1857; December 11, 1857. A private line was rumored as early as 1847, and a bill incorporating the Reading, Lebanon, and Harrisburg Telegraphic Company was passed by both houses of the Legislature in 1848. This bill, however, was vetoed by the Governor. Another attempt to secure a charter was made in 1849. This attempt also failed. M. S. Wickersham to Adam Grittinger, Philadelphia, January 15, 1849. Grittinger Correspondence, Lebanon County Historical Society.

35. *Lebanon Courier*, November 2, 1865.
36. *Ibid.*, August 13, 1858.
37. *Ninth Census*, (1870), I, 251.
38. *Ibid.*, I, 251.
39. Struble, George., The English of the Pennsylvania Germans, in *American Speech*, X, No. 3, October, 1935.
40. The publications of the Pennsylvania-German Society and the Pennsylvania-German Folklore Society contain many articles of this nature. Of the more recent books on the subject, one of the best is Cornelius Weygant, *The Red Hills*.
41. Rockey, John L., The Eastern Border of Lebanon County, in Lebanon County Historical Society *Papers*, III, 62.
42. *The Penn-Logan Correspondence*, II, 103, William Penn to James Logan, London, 7th 12th mo. 1705/06. See also *ibid.*, II, 110.
43. *Pennsylvania Archives*. Fourth Series. *Papers of the Governors*, I (1681-1747), 675; *Colonial Records*, IV, 313.
44. A Journey on Horseback, 1799, in *Pennsylvania Magazine of History and Biography*, XIV, 190. This traveller, though, had great difficulty in understanding the eating habits of the Germans, for, he exclaimed, they ate "Salad with milk, oil, vinegar, bonny clabber and bread; good God! how can they work so hard on such food". *Ibid.*, 192.
45. Donehoo, George P., *Harrisburg the city beautiful, romantic, historic*, I, 52
46. An adequate life of General John Philip de Haas has not yet been written. His great-great-grandson, Abram Hess, has written the most recent sketch of the General's life in Lebanon County Historical Society *Papers*, VII, No. 2, (1916). The names of some of the other early Huguenot settlers in Lebanon Township were: Jacob Kieffer, Isaac Couchet, George Laroux, and Abraham Raiguel. Dunaway, Weyland, The French Racial Strain in Colonial Pennsylvania, in *Pennsylvania Magazine of History and Biography*, LIII, 333.
47. *Pennsylvania Archives*, Third Series, XVII, 545-556; 664-672.
48. *Statutes at Large of Pennsylvania*, X, 67-74.
49. Cited by Egle, *op. cit.*, 52.
50. *Executive Document* No. 76, 27:2 (1841-42). *Sixth Census*, 1840.
51. *Ninth Census*, (1870), I, 58-59. For the year 1870, however, the figure of 89 is also given, *ibid.*, 251. See also the *Sixth Census*, *Executive Document* No. 76, 27:2 (1814-42) and the *Preliminary Report of the Eighth Census*, 1860, *in House Executive Document*, No. 116, 37:2.
52. *Lebanon Courier*, June 29, 1855.
53. *Pennsylvania Archives*, Third Series, XVII, 135-143; 149-155.
54. *Ibid.*, 412-421; 332-338.
55. *Ibid.*, 791-802; 873-881.
56. *Lebanon Courier*, December 15, 1854.
57. *Ibid.*, January 2, 1857.
58. Some of the early emigrants went to Center County, Pennsylvania. *Pennsylvania Magazine of History and Biography*, VII, 352. Other emigrants went to Ohio, Narrative of John Heckewelder's Journey to the Wabash in 1792, in *Pennsylvania Magazine of History and Biography*, XII, 43.
59. Levi Kline to Adam Grittinger, Lebanon, January 23, 1849. Grittinger Correspondence, Lebanon County Historical Society.
60. The editor of the *Courier* on March 2, 1849, had this advice to offer to the "young men who are *talking* of going to California", "you that are in business here, and making a living, stay where you are; you who are out of business, and willing to run the risks, go to California".
61. *Lebanon Courier*, September 27, 1850; see also the issue of February 2, 1852.

62. *Lebanon Advertiser*, April 14, 1852, in which is to be found a notice of the departure of forty persons from the vicinity of Schaefferstown. This group went to Illinois and Iowa, in order to continue farming on what they hoped would be more favorable circumstances, rather than going to California to find gold.
63. *Ibid.*, February 18, 1852.
64. *Lebanon Courier*, November 16, 1855.
65. *Ibid.*, April 11, 1861.
66. *Ibid.*, January 4, 1856.

CHAPTER III

AGRICULTURE

For two hundred years travelers coming into Lebanon County have remarked of the excellent farms.[1] One may stand on top of Governor Dick, to the south, or upon one of the knolls to the north, and see an exceptional panorama. The entire valley presents a patchwork of farms. Only an occasional town, stream, or low-lying hill breaks the pattern. Since farming has been the occupation of the majority of the inhabitants of this county, it is only fitting that agriculture should be the first topic discussed here.

When in the 1720's and 1730's German settlers came into this region, they set the style in agriculture for the succeeding generations. The very appearance of the farm marked it off from those of other settlers. Rush, in commenting on the German farm said,[2]

> "A German farm may be distinguished from the farms of the other citizens of the state, by the superior size of their barns, the plain but compact form of their houses; the height of their inclosures; the extent of their orchards; the fertility of their fields; the luxuriance of their meadows, and the general appearance of plenty and neatness in everything that belongs to them".

Colonial agriculture as is well known, was not intensive in character. Labor was too scarce, as was capital, to permit much specialization. It is feasible to say that practically every farm was self-sufficing. Not that the farmer was completely isolated from commercial relations, but the produce of the farm was primarily for home use rather than for sale.[3] In this Lebanon County proved to be no exception. In fact, all of the German farms of Lebanon, Lancaster, and Berks Counties had a similar development.

Many of the early German settlers did not trouble themselves to secure titles to the land on which they settled, but merely moved in, found a suitable site, and settled. Because of the distance from Philadelphia, and the confusion in the land office, much of the land before 1732 was held without title, and so it was in Lebanon County before the Revolution that much of the land was occupied with no system or order.[4]

A TYPICAL LEBANON COUNTY FARM SCENE IN THE NINETEENTH CENTUR

The tax returns of 1771 for Lebanon Township, Lancaster County, give some conception as to the size of the farms in the township. The largest holder of land by far was Curtis Grubb who owned 1200 acres. Caspar Stover, one of the best known inhabitants, owned 500 acres. There were 17 farms which consisted of less than 50 acres; 65 containing between 51 and 100 acres; 71 from between 101 and 150 acres; 60 from between 151 and 200 acres; 14 from between 201 and 250 acres; 11 from between 251 and 300 acres; and 9 over 300 acres.[5] In 1782, Curtis Grubb was still the largest landowner, but several additional large landowners appear on the tax list. Adam Orth and Abram Reigle both owned more than 700 acres. In this latter year there were 31 farms listed with less than 50 acres; 72 between 51 and 100 acres; 55 from 101 to 150 acres; 72 from 151 to 200 acres; 25 from 201 to 250 acres; 14 from 251 to 300 acres and 11 over 300 acres.[6] In 1794 Cazenove gave the average farm in Lebanon Township as from 150 to 200 acres.[7]

In 1870 the farms of Lebanon County were divided in this way: 157 contained from 3 to 10 acres; 274 contained from 10 to 20 acres; 428 contained from 20 to 50 acres; 637 from 50 to 100 acres; 577 contained from 100 to 500 acres; two over 500 acres.[8] From this it can be gathered that the farms of Lebanon County were large enough to make farming profitable, yet small enough to be tilled by the farmer, his family, and a hired man or two. These farmers were not interested in agriculture or land as a speculation. They were farmers interested primarily in cultivating the soil. The excellent soil, when tilled by the thrifty, hard-working German farmers, made Lebanon County a foremost agricultural community in the Commonwealth of Pennsylvania.

It is to be expected that as population rose, land became more valuable. Information regarding prices is confused and fragmentary, but in general land which was bought from amounts of 20 to 25 dollars per acre just after the Revolution sold for 70 dollars and upwards per acre in 1830. An exception to that was the land in Hanover and Swatara Townships which brought only 15 or 20 dollars per acre. If the farm had an excellent stream of free flowing water permitting the erection of a mill, its worth would be from 150 to 175 dollars per acre.[9] In 1861 prices of 150 and 160 dollars per acre were not uncommon for farm land.[10]

Another characteristic of the German farmer of the 18th and 19th century was the care which he exercised in the erection and maintenance of farm buildings and fences. Fences in this region were usually made of wood. They were built of rails laid one above the other in zig-zag fashion known as the "worm fence". A few were made from the stones which were taken from the fields when the land was cleared. The expense of maintaining these fences was more than offset by the time and labor saved in protecting crops and livestock.[11] Most of the early homes were built of logs, but the Germans later learned to use limestone which in this section is so prevalent. That they built well is attested to by the fact that many of the stone homes built in the 18th century are still standing and still in use. Generally the buildings of the Germans were more spacious, better lighted, and better heated than were those of other contemporaries. Stoves were generally used for heating instead of fireplaces, with the result of economy in fuel and comfort. But the outstanding contribution of the German was his excellently built barn. John B. Bordley in his "Essays and Notes on Husbandry and Rural Affairs" had this to say with reference to the German barn.

> "Farmers in Pennsylvania have a commendable spirit for building good barns, which are mostly of stone. On the ground floor are stalls in which their horses and oxen are fed with hay, cut straw, and rye meal but not always their other beasts. Roots are seldom given to their livestock, being too little thought of. The second floor with the roof, contains their sheaves of grain, which are thrashed on this floor. A part of their hay is also here stored. Loaded carts and wagons were driven in, on this second floor; with which the surface of the earth is there level; or else a bridge is built up to it, for supplying the want of height in the bank, the wall of one end of the house being built close to the bank of a hill cut down. For giving room to turn waggons within the house, it is built thirty-six to forty feet wide: and the length is given that may be requisite to the design or size of the barn . . . . There are not many instances of sheds tacked to their modern barns. Their mode of building of late does not well admit of them; and room is gained by all being under one roof, covering one one or more stories, having deep sides or pitch. The roof is a costly part of buildings; but it costs no more to cover three or four stories than one.
>
> "Their barns on the side of hills (which they chiefly prefer) may be built three stories high, instead of the usual two stories, cut

> down the hill perpendicularly seven or eight feet, and built up one end of the barn close to the bank. The other walls are to be quite free and airy from bottom to top. The ground story seven or eight feet high; the next thirteen feet — the third also thirteen feet; into which grain in the straw is pitched up and there thrashed out."[12]

Another feature of the German barns, at least those of the 19th century, was the projection of the second floor six or eight feet beyond the walls of the ground floor, on the side opposite the bank. According to tradition, the reasons for this extension were to provide shelter for the farmer when he went from the feed entry to the several stalls on the first floor, and also to provide more room for implements on the second floor. Then, too, German farmers have received considerable favorable comment for painting their barns. Not only did the use of paint add to the appearance of the farm itself, but served to protect the barn from the hot sun of summer and the ice of winter.

That the farmers of Lebanon County did not lose the technique of barn building in the 19th century is shown in the following comment made by the *Lebanon Courier*. "Lebanon County is noted for attention farmers pay to the construction and preservation of their Barns . . . . in a recent ride up the Hanover Road we were particularly struck with the taste displayed about the Barns; and we noticed one, we believe belonging to Mr. David M. Rank, built in a style to make a handsome dwelling. Such attention to outhouses is a sure guaranty of a thrifty and industrious people ."[13]

Husbandry in the 18th century was a mixed one; farmers cultivated small areas of cereals and raised some livestock. In the middle colonies, the chief crop was Indian corn or maize. This became a staple article of diet. There were several reasons for this. Maize yielded more food per acre than other grains, it was less dependent upon weather and climate, and required less preparation of the soil than other grains. Because of the lack of tools and implements and the primitive nature of tools which the farmer did possess, this fact was important.[14] In addition to maize, wheat, rye, barley, oats, and buckwheat were raised by the early colonists. Barley was used in the making of beer; oats was used as feed for horses, and was not used for human consumption until the beginning of the 19th century.[15]

Many farmers, especially among the Germans, soon turned to large-scale growing of wheat. In 1775 the author of *American Husbandry* called wheat "The Grand Article of the Province".[16] And in 1783, Schoepf, travelling through the Lebanon area said that the region was famous for its wheat.[17] Generally since wheat was one of the most profitable of products, the farmers sold off their wheat and used the other grains on the farm — feed for the farm animals or food for themselves. Rush estimated the profits from the sale of wheat to be so great as to permit a farmer to buy an additional farm for one of his sons.[18]

However, after considering all of his faults, and all of the criticisms which have been made of him and his farm practices, the German farmer of Lebanon County maintained an agricultural skill which was hard to equal.[19] Even though he had only crude implements and tools with which to work, and though he did at times use wasteful methods, throughout the eighteenth and nineteenth centuries he was to be recognized for his ability to manage a farm. As late as 1855, for example, one "J.G.S." who had moved from the Lebanon region to Iowa, wrote to T. T. Worth that in spite of the excellent soil and crops to be found in the west, "still, I think, if we had some of those Lebanon county farmers here, they could beat these western farmers in raising crops, provided they could manage here as there".[20]

Since it was necessary for the new settler to have some crops, no matter how small, in the first year, the first task to confront him was to clear the land of underbrush. When his land contained a great deal of woodland, as was frequently the case, he used one of several methods to clear some of the land of trees, as well. One of these methods was called "girdling", by which the settler simply cut a gash all the way around the trunk of the tree, cut off some of the heavier branches to let the sun through, and then let the tree die. Although Rush claims that the German farmer refused to use this method, but says rather that they cut down the trees, burned them, and removed the stumps,[21] it is difficult to see how the early settler found time for all this. That girdling was practiced by the German farmer of the Lancaster area is also to be seen in an entry to that effect in John Penn's *Journal*, 1788.[22]

After the ground was prepared for planting, the seeds of corn, wheat or

rye were raked in by hand or scratched in with a primitive harrow.[23] For this method the farmer was justly criticized by several writers on agricultural subjects. The author of *American Husbandry* declared that the use of this method of planting together with the habit of planting the same crop in the same field year after year caused poor crops.[24] In the 18th century there was no regularly observed succession of crops. Crops were planted on the same field for several years in succession; then the field was allowed to lie fallow.[25] "It is owing to this general bad management that they get not greater crops; for in the back parts of the province are as fine lands . . . . as any in the world; but soil alone will not do, good culture is no less requisite."[26] From available records we may conclude that the farmers of Lebanon County followed this practice until well after the Revolution. During the nineteenth century, however, systems of crop rotation were being developed. Naturally, the type of rotation which was adopted depended upon several factors; the soil of the individual farm, the crops in local demand or favor, and the general care which the farmer gave to his farm. William Rank, a careful farmer as well as a careful diarist, numbered or named all of his fields.[27] Hence it is possible to follow the plantings in each field year after year. In his "Hill Field", for example, from 1852 to 1878, the general pattern of rotation which Rank followed was corn, oats, rye, and wheat, with an occasional omission of rye from the sequence in order to produce another crop of the more profitable corn. It will be noticed here that no care was exercised to replace the nitrogen that had been taken from the soil. This replacement was partially accomplished by the annual use of manure.[28] On several of the other fields of this farm clover seed was periodically planted.[29] Due to the high prices received (as much as $6.25 per bushel in 1862)[30] for the seed itself, however, it is doubtful whether this crop was planted for its nitrogenous value only. How widespread was this practice of crop rotation throughout the county it is impossible to state. After the formation of the Lebanon County Agricultural Society,[31] it is reasonable to suppose that its members at least were benefitted by a comparison of the methods each of them used.[32]

Mention has been made of the primitive implements available to the farmer from the time of the earliest settlements. The universal implement was the hoe. The plows used were heavy, clumsy, wooden affairs. Then in the eighteenth century the practice of tipping them with iron was adopted. The

harrow also came to be used rather commonly. Wheat was cut with the long grain sickle and the scythe. Threshing by means of oxen and horses was giving way to the use of the flail.

When the plow came to be generally used in Lebanon County is not known. Presumably farmers in this area followed the general practice of their neighbors in Lancaster or Berks. They were severely criticized in the Revolutionary period for poor ploughing. "Thus, in most parts of the province, is found shallow and unleveled furrows, which rather scratch than turn the land; and of this bad tillage the farmers are very sparing rarely giving two ploughings if they think the crop will do with one; the consequence of which is their products being seldom near so great as they would be under a different management."[33]

The drill plough which was invented by Jethro Tull was introduced into Pennsylvania in the 1770's. But the extended use of this implement did not come until the fifth decade of the 19th century. In 1841 one William T. Pennock of East Marlboro began to make drills on a small scale.[34] By the end of that decade drills were used rather extensively in our area. In the issue of July 22, 1848, of the *Lebanon Courier*, David Karmany advertised for sale an "Improved seed planter". In the same paper on the 16th of November, 1855, the editor notes that "our farmers now very generally use the drill (for planting) and the handsome appearance of their fields bear testimony to its merits". However that may be, the diaries of the two farmers referred to above do not mention the use of the drill until 1867 in the case of Albert, and 1873 in the case of Rank.[35]

By performing both the function of seeding and covering, the drill made for a great economy of labor, larger yields, and in addition required less seed. When grain was sowed by hand, the farmer could cover about seven and one-half acres in a ten-hour day; but when he used the Pennock drill, he could plant from ten to fifteen acres per day.[36]

During the decade of the 40's John Deere and others were producing steel plows on a commercial scale. Pennsylvania farmers continued to use the cast iron plow, however, because it was cheaper than the steel plow, and because its weight held it more steadily in the furrow. The lighter steel plow

was likely to jump out.[37] It is of some interest to note that several farmers of the county were interested in improving the plow. In 1851 George A. Walker of Annville applied for a patent on an improvement in securing the point of the self-sharpening plow. The point was so constructed and arranged than when it became dull it could be taken out and reversed, the edge that had been uppermost then being placed underneath.[38] Another resident of the county who secured a patent for a new and improved plow was Joseph K. Gingrich of North Annville Township.[39]

It has been mentioned that during the colonial era grain was harvested by the sickle and the scythe. In the 19th century these implements were improved upon by the introduction of the cradle. The use of this implement allowed the farmer to plant more grain than he had previously planted, because the size of his crops was limited to the amount he was able to harvest. In Lebanon County the cradle was used to some extent in the early decades of the 19th century, but it was not until the decade of the forties that the use of the grain cradle became general.[40] This implement proved to be so useful, especially in small fields and along fences, that it is still being used in several parts of the county.[41]

Meanwhile machines were being manufactured by Hussey and McCormick which would soon displace scythes and cradles. Stationary and movable threshing machines were being used as well as the flail. One of the early reapers introduced into Lebanon County was the "Many's Patent Adjustable Reaper and Mower". The claim was made for this reaper that it would cut from eight to twelve acres per day with two horses and two persons to tend it. The cost of this machine was $125 cash or $135 if paid in a cash payment of one-half of the amount and the rest on credit.[42] Here again Rank and Albert give evidence that machines were not as rapidly introduced as might commonly be expected, for it is not until 1870 that Rank notes having mowed hay with a machine; and not until 1869 does Albert indicate having bought a mowing machine.[43]

Hence it may be seen that in the several decades following 1840 many improvements were made in agricultural machinery. Not all of them were immediately introduced into Lebanon County, for the German farmer gives every indication of following the old saw,

"Be not the first by whom the new are tried,
Nor yet the last to lay the old aside."

Even though the editor of the *Courier* in 1864 might caution the farmer not to be careless about the use of farm machinery, and though he may comment upon the "large number" of mowers in his vicinity, there is also evidence that the scythe and cradle were still very much in use.

As the farmer saw the advantages which accrue from the use of farm machinery he doubtless came to the conclusion that eventually he would have to have some of the improved implements. When he saw, for example, that whereas through the use of the cradle he could reap only three or four acres of grain per day but that by using a machine he could reap as high as fifteen acres per day, he soon came to see the importance of purchasing one.

From time immemorial men have threshed their grain by having it trod out by horses or cattle. By so doing much of the grain was wasted, and the farmer had to spend a great deal of time which could have been used more advantageously elsewhere. Most farmers in the 18th and 19th centuries did their threshing in this manner on the bare ground which resulted in the loss of much of the grain and caused a great deal of dirt to be mixed with the grain, a condition which the thrifty Pennsylvania German farmers would not tolerate. Their method, on the other hand, was to trod out their grain on the wooden floors of their barns which were cleaned for the purpose, or on specially prepared wooden platforms which could be put away when not in use.[44]

Another method of threshing used in the period before the Civil War was the use of the flail. This method usually required the services of several hired men or neighbors in addition to the farmer himself. "Flailing" the grain was usually done indoors during the inclement winter months when it was impossible for the men to work out of doors. The use of the flail continued through the latter half of the 19th century and into the twentieth century, long after the threshing machine had become a commonplace. It was then used particularly to thresh small crops, or rakings which were gathered after the itinerant threshers had left the farm, or by farmers whose crops were not of a sufficient size to warrant the purchase of a machine.[45]

As the amount of grain produced in the 19th century began to rise, men began casting about in search of a machine to thresh grain which would free the farmer from having to use animals or the flail, both of which were tedious and time-consuming. One of the earlier and more popular threshing machines consisted of a spiked cylinder enclosed in a case and mounted on a wooden frame. The power for this machine was supplied by from two to four horses. This machine was commonly known as Pope's Machine. Winnowing was done in a fanning mill turned by hand. During the decade of the forties Pitt's Machine came into general use and both threshed and cleaned in one operation.[46] From this development there came into being that phenomenon known as the itinerate thresherman. These men operated largely in the eastern states, especially in the wheatgrowing section which included Lebanon County. A small farmer who owned his own machine would continue to use it for a considerable length of time. The greatest advance by far, the one which was to revolutionize the threshing of grain, was the introduction of the steam driven threshing machine. These machines were introduced into some sections as early as 1860.[47]

A comparison of the results achieved in threshing by use of the flail as against the use of a machine shows that with the flail about eight bushels of grain could be threshed per day; the early machines could thresh between 100 and 125 bushels per day. As improvements were made to these machines, that output was increased to 135 bushels per day.[48]

Specifically in Lebanon County the earliest recorded use of a threshing machine is in 1854. In March of that year, the grain on one of the Coleman farms at Cornwall was threshed by a "Thrash Machine". Evidently the Colemans had not thought it necessary up to that time to buy a "machine", for this particular one was rented at a cost of $5.49.[49] During the next decade these machines were used more frequently, a fact which is proved by the many references to injuries caused by the use of the threshing machines in the county. On December 8, 1849, the *Courier* stated that one Michael Tice, who lived near Myerstown, was injured by a threshing machine while "taking out" his grain. Similar instances of injuries as reported in the newspapers would seem to confirm the fact that the farmers did not learn too quickly how to handle the new labor-saving device.[50] In fact these accidents were so frequently recorded that the editor of the *Lebanon Courier* finally felt it

necessary to caution the farmers of the county about the careless use of farm machinery.[51] In 1855 Cyrus Sherk was announced as the agent in Lebanon County for "Wheeler's Overshoot Thresher",[52] though with what success these machines were sold is not disclosed. An examination of the several diaries of William Rank reveals that as early as 1861 grain was threshed on his farm by use of a "Machine", although as late as 1877 he records having used a flail to thresh rye.[53] The continuation of the practice of threshing rye by flail rather than by machine power was occasioned largely by the need for unbroken straw. It could be used for tying and binding grain shocks and corn shocks, and served as a winter covering for young crops and trees. Thatched roofs were kept in repair by the use of this so-called "long" straw. In threshing rye by flail, the unthreshed rye was carefully laid out so that only the heads were hit by the flail, thus preventing the breakage of the straw.

So far as can be learned the farmers of Lebanon County continued to use the cradle and scythe to cut grain until the end of the period under review. Threshing by means of the steam engine came in during the decade of the 70's.[54]

The old method of cleaning grain and separating it from the chaff by throwing it into the air and allowing the wind to carry off the lighter chaff was used in our section until the decade of the sixties. It was in 1862 that Rank first records cleaning wheat in a fanning mill.[55] There are some reports that fanning mills were in existence before the Revolution, but Cope reports the use of hand-winnowing well into the early part of the 19th century.[56] The fanning mill illustrates once again how, during the period of the 1840's through the 60's, the farmer's work was greatly aided by the introduction of machines. Whereas in winnowing by hand it has been estimated that twenty bushels of wheat could be separated from the chaff in a day, by the use of a fanning mill as many as four hundred bushels could be cleaned and sacked.[57]

One other labor-saving machine introduced into Lebanon County in the 1840's deserves mention. For centuries farmers have had to shell corn by hand, a process both lengthy and fatiguing. While the younger folks from the farm might have expressed disappointment in the loss of one of their few

opportunities at romance, which had been provided by a corn-shelling party, that loss was more than made up by the reduction of labor and the saving of time by the corn-sheller. One of the early corn-shellers is described as having been for sale at the hardware store of David M. Karmany, Lebanon. One of the interesting features of this machine is that it was made of cast iron.[58]

Of the several grains raised in Lebanon County mentioned above, corn maintained first rank in number of bushels produced annually. The county was part of the leading corn-growing region of the east, a region which included Maryland, Delaware, New Jersey, and southeastern Pennsylvania. In 1840 Lebanon County produced 239,031 bushels.[59] In the next two decades, owing it has been said, to the decreased acreage of fallow land and to the use of more manure, the production of corn increased in Lebanon County to 546,143 bushels.[60] In 1870 the production was still further increased to 627,881 bushels.[61]

Quantitatively oats was the second largest crop of the county. In 1840 there were 232,601 bushels of oats produced in Lebanon County;[62] in 1860, 533,873 bushels;[63] in 1870, 678,614 bushels.[64]

As has been stated above wheat was the most profitable of all the grain crops. Though it did not supplant corn in the number of bushels produced, it was the crop which frequently meant either profit or loss to the farmer. As such the state of the crop in Lebanon County is a matter of frequent interest to the editors of the several newspapers. In 1847, for example, the wheat crop was said to be "unpromising" and that at prices then prevailing, corn was the most profitable crop to be raised that year.[65] In 1852 the crop of wheat was said to be "light",[66] but the corn crop was excellent. One field of corn of twelve acres in Swatara Township belonging to George Heilman averaged ten feet in height, many stalks having five ears.[67] In June, 1854, the editor observed an excellent crop of grain for the county, while a fellow townsman, travelling in the west wrote that the wheat crop in the west is "poor, almost beyond description".[68]

That the soil of Lebanon County was early recognized as being excellent for the production of wheat is to be noticed in the several comments made by

the author of *American Husbandry*.[69] Schoepf in 1783 said of the soil in Lebanon and Berks Counties, "It is famous as very good land for wheat. The wheat, which is sown in autumn, reaches almost its fullest growth, through the influence of the moderate and generally wet spring until June, before the great and constant heat of summer begins . . .".[70]

Although Pennsylvania lost the lead in the production of wheat as early as 1839 when Ohio was the top-ranking producer of that grain, two sections of Pennsylvania remained important in the production of wheat. One was the limestone area in southeastern Pennsylvania, the other was in the western part of the state. So greatly did production increase in the decade of the 40's that in 1849 Pennsylvania again took first place in wheat production, with Ohio second. By 1860, however, the center of wheat production had definitely and permanently moved west into the states of Illinois, Indiana, and Wisconsin.[71] As part of the limestone area of Pennsylvania, Lebanon County continued to be an important producer of wheat. A comparison of the number of bushels of wheat raised in the county in the decades following 1840 substantiates that fact. In 1840, for example, the farmers of the county produced 215,428 bushels of wheat.[72] Two decades later, in 1860, that amount was almost doubled, the production in the latter year being 402,237 bushels.[73] In 1870, despite the decline in production during the Civil War, the production of wheat rose to 538,308 bushels.[74] This rapid rise in wheat production is indicative of the increased acreage that was devoted to wheat-growing, which in turn was made possible by the use of more scientific methods of farming and an increased used of labor saving machinery.

Only occasionally was the wheat crop threatened by pests, for on the whole the county remained rather clear of their depredations. Of the pests which did bother the farmers of the county the most serious was the wheat fly. In 1853 the damage done to the crops by the fly was very serious. On some farms entire fields were destroyed. On others farmers turned their cattle into the fields so that some food value might be derived before all was lost.[75]

In the growing of rye the farmers of the county showed a declining interest in the several decades before the Civil War. In proportion, most of the rye produced was used by the local distilleries in making rye whiskey,

while much of the remainder was used to make rye bread. Strickland in his *Observations* wrote, "All the back country of America is very favorable to the growth of rye; crops, producing from twenty to thirty bushels, are commonly met with; this grain is entirely consumed in the distillation of whiskey, chiefly for the consumption of the Irish frontiersman, except among the Germans in Pennsylvania, who use it for bread".[76] Rye straw could also be used in addition to hay as winter fodder for livestock. The soil in some parts of the county was particularly suited for the growing of this grain. William Rank, whose farm was in the central part of the county, produced some noteworthy stalks of rye. In 1863, following the practice of sending to the editor of the local newspaper outstanding farm productions, the *Courier* noted that one such extraordinary specimen of rye sent in by Rank measured seven feet, six inches.[77]

Once again by a comparison of statistics cited in the Census reports, it will be noticed that the number of bushels of rye produced in Lebanon County successively declined after 1840. In that year the farmers of the county produced 147,254 bushels of rye.[78] Two decades later, in 1860, production had fallen to 81,813 bushels,[79] and by 1870, the amount raised was less than half of that of 1840, being but 70,186 bushels.[80] The probable reasons for this decline were the growing preference for "white bread", the decrease in the number of distilleries which meant a lessened demand for rye, and the success of the temperance movement of the forties in the German counties. Compared to wheat, then, at the end of our period rye had become an unimportant farm crop in Lebanon County.

The growing of buckwheat never became popular with the farmers of this county. At no time were production figures of this crop very impressive. In 1860 the number of bushels raised was only 1,086.[81]

Another very important crop of the farm was hay. In 1840 the principle hay-producing states included the New England region, New York, Pennsylvania, and New Jersey. In eastern Pennsylvania hay was produced in the established rotation of corn, oats, wheat, and grass. Many times in the two decades prior to the Civil War the editor of the *Courier* comments upon the excellence of the hay crop. In 1854 for example he states that the crop would be very "handsome".[82] "These are certainly good times for farmers

and they are no doubt making a harvest of dollars."[83] In 1870 the county produced 41,894 tons of hay,[84] which was more than two and one half times as much as was produced in 1840 when the production was 16,560 tons.[85]

The farmers of Lebanon County did not pay a great deal of attention to development of fruits and orchards. The occasion for this, as with so many other crops, was the lack of time and labor available to the farmer, and the lack of a ready market. Hence it was that while every farm had an orchard consisting of apple, pear, cherry, and peach trees, no specialized cultivation of these fruits was possible.[86] The raising of apples was most widespread, because the apple tree was extremely hardy, and could be used to make cider, one of the favorite drinks of the farmers and townsmen alike.[87] Peaches were introduced into Pennsylvania along the Delaware sometime before the arrival of William Penn. From there the raising of peaches spread rather rapidly into the interior. But the extensive development of peach orchards was to wait until after the Civil War. The Krouser apple, famous in the middle of the 19th century, received its name from Adam Krouser who lived near Myerstown, Lebanon County, indicating that some farmers in this area before the Civil War were interested in developing fruits.[88]

One of the early crops of colonial Pennsylvania was flax. As was the case with other products, the amount of flax raised annually was somewhat dependent upon the time and labor available to prepare the fibre and to spin and weave it into cloth. In spite of the many urgings the farmers received from such men as the author of *American Husbandry*, and others down to the Civil War, farmers generally, including those of Lebanon County, never paid much attention to the raising of this crop. However, in 1850 the editor of the *Lebanon Advertiser* states that during a walk in the country he saw several men and women in a barn "busily engaged in hammering the seed out of a large quantity of flax".[89] Storekeepers and millers likewise expressed desire in their advertisements for more flax seed.[90] In Lebanon County the editor of the *Courier* took up the refrain in 1862 in an editorial in which he strongly urged all Lebanon County farmers to raise flax. "There will, unquestionably, be a great demand for it, and those who are wise enough to prepare to meet the demand will realize handsome profits on their crop."[91] The census returns of 1860 and 1870 give an excellent indication that in spite of all of the urgings official and otherwise, and in spite of editorials similar to

the one mentioned above, our farmers paid little heed to the raising of the commodity. In 1860 only 1,253 pounds of flax were raised in this county; in 1870 production fell to about one-third of this amount or 419 pounds.[92]

Some attention was given to the raising of clover. Speaking of Pennsylvania in general, Acrelius found that farmers in 1759 were sowing clover seed "after they had harrowed in their wheat to make the crop stronger".[93] After the Revolution the raising of clover became more widespread, although Watson says that in Lancaster and Bucks Counties the raising of clover was hardly known before the beginnings of the 19th century.[94] There are few indications of the extent of clover raising in Lebanon County. Just before the Civil War it was estimated that in ordinary seasons a crop of clover seed would average three bushels per acre; in exceptional seasons four or five bushels per acre. During most of the decade of the fifties clover seed sold at a high price, most of the time selling for not less than six dollars per bushel, and for several years the supply did not equal the demand. In spite of the advice to raise more clover given to the farmer by the several editors of Lebanon, the production of clover seed fell from 5,902 bushels in 1860 to 2,643 bushels in 1870.[95] Farmers ordinarily do not grow clover for the seed, which must be threshed out by special and expensive equipment (the seed is very, very small), but for hay. They would, therefore, be required to pay a high price for the seed, without any prospect of cashing in later on the prevailing high price of seed. But figures regarding the amount of seed produced must not be taken as an index of the acreage in clover. Since a clover field will reseed itself, the decline in seed production likely was an indication that the region was pretty thoroughly planted, and on that account, the seed was no longer in demand.

Although the neighboring county of Lancaster has been one of the prominent tobacco raising areas of the world for many years, Lebanon County for several reasons never took up the production of that plant to any great extent. Some of the soil of the county is not particularly well adapted to its production, but of greater importance, there were at times moral arguments used against both its production and use. For example, in 1851, the editor of the *Lebanon Advertiser* said, "We see that attempts are being made in some parts of our county to cultivate the tobacco plant. Whether the climate

and soil are favorable we know not, but hope, since the distillery is knocked on the head, that the tobacco press will not take its place ".[96] So it was that in 1860 the farmers of the county raised only 1,804 pounds of tobacco, and in 1870 the production fell off to the inconsequential amount of 131 pounds.[97]

There is little evidence available to show that silk culture was ever undertaken on any considerable scale in Lebanon County. Although the author of *American Husbandry* wrote that mulberry trees were among the most common productions of the province of Pennsylvania and that "silk might be made in any quantities",[98] the reply of the farmer seems to have been that the cost of labor was too high to make the raising of silk profitable and that the climate was none too favorable anyway. There is on record only one attempt made to raise silk in this county. In 1837 the "Lebanon Sugar and Silk Company" applied for and received a charter from the State Legislature. The Company was capitalized at $50,000, consisting of 5,000 shares of stock at $10.00 each. Because of the then current opposition to banking and "monopolies", the provisions of the charter are interesting for their prohibitions as well as for the provisions concerning sugar and silk production. After a recital of the privileges and liabilities of the Company it was stated that the Company was not to have "any banking privileges whatsoever; or any other liberties, privileges or franchises, but such as may be necessary or incident to the growing of and manufacturing the beet sugar, and cultivating the mulberry and manufacturing silk; Provided further, That the said Company shall at no time hold or possess more than five hundred acres of land to cultivate beet and manufacture silk".[99] The list of names comprising the Commissioners of the Company illustrates the fact that many of these corporations were purely of local origin, both as to management and capital. Among the names listed were Jacob B. Weidman, the owner of Union Forge, Lyon Lemberger, the owner of the woolen mill bearing his name, Dr. John Gloninger, Simeon Guilford, and Samuel Rex. Notwithstanding the charter, and the ability of the men listed above, the Company was never successful. Three years after its founding, there were one hundred pounds of silk cocoons raised in the county as reported in the Census of that year.[100] There is no proof, however, that even this slight amount was due to the operations of this Company. Whether it was or was not is immaterial;

during the next decade all attempts to raise silk failed for not again is there any listing of silk or silk cocoons either in the Census Reports or in accounts of agriculture and industry to be found in the newspapers of the region.

Before turning to our next topic, livestock, it might be of interest to mention briefly the methods of soil improvement used in the county. The use of crop rotation and the use of manure by our farmers have already been referred to. One other method of soil improvement highly favored by Lebanon County farmers was the spreading of powdered lime or "plaster", over the soil in order to overcome acidity. This value of lime was early recognized. Since much of the central and southern parts of the county lie in the limestone region, farmers were quick to take advantage of the limestone to be found on their farms. Lime-kilns were built frequently by the farmer in which to burn the limestone he took from his fields. The resulting product could then be hauled on to his fields or be sold or traded to his neighbors.[101] In parts of the county where limestone was not found, the farmer could obtain "plaster" from the local miller. On April 13, 1866, Albert records in his Diary a trip "to the mill" for "plaster—one ton—$13.00".

The early property of the Pennsylvania settlers included livestock of many kinds — cows, oxen, sheep, swine, and horses. At first there were not many of these animals to be found in the colony. The Indians had no domestic animals except, possibly, the dog, from which the colonists could have been supplied. Another reason for this original lack of farm animals was the high mortality rate among such animals as were shipped from England or Europe to America. Notwithstanding these difficulties, it was not long before the colonists became entirely independent of foreign sources of supply, and developed a surplus for export.[102] Two of the problems confronting the settler in the raising of livestock were first the problem of shelter and second that of forage. The first of these was adequately provided for by the Pennsylvania Germans as was noted above in their building of excellent barns. The soil of Lebanon County provided excellent pasturage for the animals which the early settlers brought with them and for herds which they developed at a later time. Especially was this true after the introduction of the English grasses. These grew so rapidly that in a few generations they were so widespread that many persons thought them to be indigenous.[103] Cattle, including working oxen, seemed to have been the most important livestock in

the colony, although sheep were also important. These latter came largely from England and Holland. Little information can be found concerning sheep in early Pennsylvania. Budd and Thomas both seem to agree that there were many sheep in the colony, but other than that little is known. To William Penn must be given credit for first attempting the breeding of horses, he having brought over three brood mares in 1681 and the famous colt Tamerlane in 1699. It was left to the German farmers of Pennsylvania however to develop the great Conestoga horse, the best draft animal on the continent during the colonial period, and likely the most valuable of all horses during the time that the horse had to do most of the work now done by machines.[104]

Swine seemed to have thrived in the colony from the very beginning. Every farmer raised them especially with a view of supplying the family with salt pork. No attention was paid to the scientific feeding or breeding of hogs since they were fed on kitchen refuse, and were permitted to forage for themselves.[105]

Although the number of cattle and other animals was first recorded in the census of 1840, a reasonably accurate number can be found in the tax lists of Lebanon Township for 1771 and 1782. In the former year there were a total of 818 cattle in the township, the largest holder having a herd of nine cows; 97 taxables reporting the possession of one cow, and 23 taxables reporting none.[106] In 1782 there were at total of 989 cattle. In that year Curtis Grubb reported the ownership of 15 cows and Jacob Xander 14 cows; 129 taxables reported the ownership of one cow, and 62 reported none.[107] By 1840 the census showed that eastern Pennsylvania had become a center of cattle raising. During the fifties and sixties there was a marked increase in the number of cattle raised in Lebanon County, although by the latter decade the cattle feeding industry was moving west due to the possibility of using the railroads to ship cattle in all seasons of the year.[108] In 1840 there were 14,781 cattle reported in Lebanon County; in 1860 there were 18,859 cattle reported; and in 1870 there were 20,894 cattle reported.[109]

There were several reasons why the two decades before the Civil War show an increased number of cattle. Reference has already been made to the increase of population in the county during these years. Another reason for this increase is to be seen in the decrease in the number of distilleries

which in previous years took much of the grain which could not be profitably converted into food for stock.[110] With the increasing number of persons engaged in the growing industries of the region, the need for beef and dairy products became ever greater. These needs the farmer attempted to supply by raising larger herds of cattle.

Prices for cows in the period before the Civil War varied from twenty dollars to forty-six dollars per head, although in 1848 the price of forty-two dollars was thought to be "extraordinary".[111]

Horses, while not showing the spectacular rise in number as was seen in cattle, nevertheless do show a steady increase in the county. In 1771 there was a total of 736 horses listed in the tax lists of that year, lists which totalled 351 taxables. Curtis Grubb, of Cornwall Furnace, had 21 horses, by far the largest number of any taxable. The larger number of taxables owned from two to four horses, while 74 taxables listed none.[112] In 1782 there was a total of 801 horses in the township by which time the number of taxables had increased to 462. Again Curtis Grubb is the owner of the largest number, 25; most of the farmers still having from two to four horses on their farms and 132 taxables listed no horses.[113] It might be interesting to note here that in 1771, there were 20 taxables who listed neither horses nor cattle, while in 1782, 51 taxables had neither horses nor cattle. Allowing for the fact that some of this livestock would be owned by town-dwellers, these figures would seem to indicate a growing number of inhabitants who were no longer dependent upon agriculture for a living and that industry was growing strong enough to take care of an ever-increasing population. As has been seen in the case of cattle, the number of horses also increased in the first four decades of the 19th century. The census of 1840 lists 5,006 horses;[114] in 1860 the number of horses increased to 6,593;[115] while in 1870 the number was 6,895.[116] Prices in these latter decades also vary greatly. In 1855 for example at the sale of one Peter Zimmerman, four horses of his own raising sold for $637.50, averaging $168.37½.[117] In the next year at the sale of Jacob Smith a three year mare colt sold for $180.00; one year colts sold from $61 to $72 per head.[118] In 1861 at the sale of Joseph Reber prices of horses ranged from $127 to $187, while one year colts ranged from $45 to $72.[119]

Hogs, one of the most useful animals on the farm, and, as has been noted, one which required the least attention, were extensively raised in Lebanon County. In 1840 there were 13,780 hogs listed in the census.[120] In 1860 there were 14,612;[121] while in 1870 there were 13,953.[122] Farmers took great pride in raising large hogs and having that fact noted in the newspapers. In 1848 the editor of the *Courier* after telling of four hogs which were killed during the third week of December and which averaged 400 pounds each, said that that was not much above the ordinary size for this section "but in some sections they would be considered extraordinary".[123] One of the largest hogs reported in the years before the Civil War weighed 550 pounds and was owned by Mr. Gockly, a farmer near Schaefferstown.[124]

Most of the land in the colony and state of Pennsylvania was suitable for the raising of sheep, for even on the worst kind of mountain land flocks could be grazed. The wool was not as good quality as that of England or Spain, but it filled a need of the inhabitants in making fine as well as coarse clothing. No records are available to show the numbers of sheep on Lebanon County farms before 1837. In that year an unofficial census ranks Lebanon County 19th in the state of Pensylvania with 30,500 as the total number.[125] Even though it is true that the decade of the thirties marked a high-water mark of sheep raising in eastern Pennsylvania which was followed by a decided decline in the forties and fifties, this figure is open to some question.[126] That the decline in the numbers of sheep raised was severe can be seen by a comparison of the numbers reported in the census of 1840 and 1870. In the former year, 10,977 sheep were listed, and by 1870 there was a decline to 2,687.[127] During this period sheep were sold for from $10 to $12 per head.[128] One of the chief difficulties in the raising of sheep was their habit of straying from the owner. There are many advertisements in the local paper for sheep that had strayed and for sheep which came to the farm of someone other than their owner. When found they could usually be claimed by the owner, who paid the charges incurred for advertising.[129]

From the very first the scarcity of agricultural labor resulted in the payment of high wages. In Pennsylvania that situation was not bettered until the coming of the indentured servant in the 18th century. During most of the time the farmers were required to depend on the labor of themselves and

their families together with occasional hired men who worked by the day, month, or year, but who at any time felt free to leave and go elsewhere. There was also a great deal of cooperation among the farmers themselves. This cooperation was seen especially during barn raising, threshings, and corn huskings. As has been mentioned above this lack of farm labor frequently served to limit the amount of grain which could be raised on the farm. In the 19th century the farmer had also to cope with the trend to the cities which greatly aggravated the problem of farm labor. This lack was not altogether taken care of by labor saving machinery. In the decades of the forties and fifties the Mexican War, the discoveries of gold in California, and the wide-scale building of railroads carried many young men away from the farm. That the farmer was able not only to continue farming but also to expand his production is a worthy testimony to his courage and ability. In Pennsylvania generally farm labor in the 18th century received on the average two shillings per day and found.[130] In the 19th century the wages paid to hired men, now no longer indentured servants, varied a great deal. In 1854 the editor of the *Courier* notes that the farmers of Chester County were paying as much as two dollars per day for agricultural labor but says that "Laborers are also scarce with us, but we believe nothing like that price has yet been offered for hands".[131] On the farm of William Rank during the decade of the fifties the following wages are to be seen. For hired men engaged by the month wages varied from three to seven dollars per month, with the average being about four dollars per month. During hay-making in 1861 when it is to be presumed that labor was not too plentiful day labor was hired for fifty cents per day.[132] On the farm of A. H. Albert in 1867 the hired man was paid $160 for the year. Other men hired during special seasons such as threshing were paid seventy-five cents per day.[133]

It is not possible to present here a detailed picture of the social life of the Pennsylvania German farmer to any extent. It is perhaps of some interest, however, to note several developments in Lebanon County which show the farmer in some activities other than agriculture. In 1845, thinking that the farmer did not have enough work to keep him busy, the editor of the *Courier* made several suggestions. According to his editorial the farmer should become the friend, companion, and equal of his wife and should devote much time to the improvement of his children, seeing to it that they were

well-clad, that they were furnished with suitable books for school, and that their evenings were employed in useful study and reading.[134] Upon another occasion this same editor said that while the farmers were too busy in haymaking and harvesting to pay much attention to politics, he had no doubt, "that they will take the matter in hand in good season to give the Locos a sound rubbing at the fall election".[135] An interesting way in which farmers cooperated with each other is to be seen in the quick action which was taken following the loss of property from fire. For example, in the issue of the *Lebanon Courier*, January 8, 1848, there occurred a notice of the burning of the barn of Dr. Gloninger, the fire having taken place on January 3, 1848. In the same issue of this newspaper there is a statement that there will be a meeting of citizens of South Lebanon Township to adopt measures to alleviate the losses sustained in the above-mentioned fire. A committee was appointed at the meeting, which was held on the day following the fire, to appraise the damages. That committee had reported the loss of $1,000. A committee was then appointed to obtain subscriptions from all persons interested in relieving this loss. On that committee all the townships in the county were represented. It is well to note that all of this action took place so soon after the fire that it could be reported in the *Courier* of January 8, 1848.

An interesting way by which the farmer was able to meet the payment of his taxes should be mentioned. It was possible for him to work out the road taxes of the township in which he lived for any given year by furnishing stone, hauling stone or lime, or by actual work on the road. This meant that he could find a profitable use for the stones other than lime-stone which he took from his fields and which otherwise were simply a nuisance to him, and also enabled him to decrease the time his horses spent in the barn, where they were an economic loss to him. That this practice was well recognized is to be seen in the following advertisement placed by the Supervisors of Cornwall Township in 1861. "All persons desiring of working out their Road Taxes for the year 1861 are hereby requested to report themselves to the undersigned . . . on or before the first day of May next."[136] There are many entries dealing with this subject in both the Rank and Albert Diaries. In 1863 William Rank himself, then sixty-eight years of age, "hauled and broke stone on the road" and in July "John hauled lime with one Horse for *township*".

This work greatly aided the farmers in paying their taxes, since the latter otherwise had to be paid in cash, an article with which the average farmer was not too familiar.[137]

During much of the time before the Civil War, it is true that most of the products of the farm were used by the farmer to fill the needs of his family and his livestock. But there remained to many of the farmers a surplus of both grains and animals which were used to supply articles not raised on the farm itself. The trade in these products, while small in extent, was important. Much of it was local in character and remained on a barter or credit basis until well into the 19th century. [138] With the improvements to roads, the completion of the Union Canal in 1827, and finally with the completion of the Lebanon Valley Railroad in 1858, farmers in Lebanon County were no longer isolated. Thus by 1860 there was opened to them ways and means of reaching other parts of the nation and the world, markets for their surplus products.

From the first, the local trade in agricultural products was carried on largely through the barter process. The farmer would load on his wagon some articles which were not needed in the home, such as eggs, butter, flax seed or wool, then take them to the "country store" or perhaps to the town of Lebanon itself. There he exchanged his products for articles he could not raise or make himself. In a number of 18th and 19th century manuscript Journals or Ledgers of store keepers, one can easily follow this barter process. For example in one such Journal of a Lebanon storekeeper, 1796-1804, the items most frequently carried home by the farmer were salt, sugar, whiskey, coffee, calico, and molasses. While to this particular store the farmers brought principally butter, flax seed, and wool. Only occasionally was part of the bill paid in cash or a promissory note.[139] Several items of an unusual nature are also of interest. In November, 1797, is recorded the sale of "Spalling Bucks" [spelling books]; and in April, 1799, the sale of "Window glass", both articles of such apparent rarity that the sale of neither occurs more than once, hence may have been specially ordered. The Account Books of Daniel Hoffman, Mt. Zion, in the years 1860-1862 show that in the rural districts at least barter was still extensively used. It is interesting to note the change which had taken place in the nature of the articles traded. Mr. Hoffman usually carried to the storekeeper butter, eggs, bacon, hams,

soap, chickens, and cider and took away with him ribbon, oil cloth, snuff, gloves, muslin, almanacs, coffee, tobacco, cinnamon, sugar, and "oil"—all of which indicate the extent to which the farmer had participated in the rising standard of living at the time of the Civil War.[140]

The change from a barter system of exchange to a cash basis was one which extended over many years. As has been noted above, barter was common down to the Civil War period, and beyond. However, early in the 19th century sporadic attempts were made to do business entirely on a cash basis. Storekeepers and merchants came to realize that while they paid cash for their goods to firms in Philadelphia, Baltimore, and Harrisburg, selling those goods on a credit or barter basis many times resulted in losses they could ill afford. In October, 1818, William Hazleton advertised his "Cash" shoe store in the town of Lebanon.[141] In 1819, Daniel Keller announced the arrival of a "new and complete assortment of the first quality of Dry Goods . . . which were bought at the auction in the city of Philadelphia". Since he paid cash for these goods "his friends and customers would greatly oblige him by furnishing him as much as possible with cash or country produce". The credit difficulties confronting a merchant were further emphasized by a note appended to the advertisement: "All those who are indebted to him 1, 2, or 3 years back, are hereby earnestly requested to give him an early call and discharge their old accounts . . . ."[142]

The advocates of doing a "cash business" received a strong supporter when in September, 1849, the North Lebanon Steam Flour Mills, owned by Myers and Beckley adopted a cash system. In notifying their customers of the change the proprietors said, "Thereby they will have no losses to contend with, and will be enabled to sell cheaper . . . . Instead of having their capitals in their books, they can have it invested in grain . . .".[143] In the same year, Isaac Hambleton announced his new cash store, and claimed to be able to undersell his competitors by 15% because he would do a cash business.[144]

The editor of the *Courier* also took up the refrain for more cash business. In numerous editorials, he again and again urges business men to stop giving, and farmers and other to stop asking for, credit. One scheme presented by him was the proposal to call a meeting of all the business men of the county for the purpose of adopting a general system of credit. He

suggested granting credit for three to six months and after that interest should be charged.[145] His plan, however, met with no success. The "hard times" of 1857 which were quite marked throughout the county brought about some beneficial changes in business practices which did affect agricultural trade. That development lies outside the scope of this study. On the whole these instances of a desire to do business on a cash basis instead of barter on long term credit, however, were isolated cases. The older firms and even stores which were being opened in the forties and fifties announce to their customers that they will take "country produce" in exchange for goods.[146] Hence it can be taken for granted that, with exceptions, much of the trade, and especially local trade involving agriculture products, which was carried on before the Civil War, was of a barter or credit nature.

During the first three decades of the 19th century, local trade in agricultural products was greatly facilitated by the holding of markets and fairs. Both of these institutions afforded a central place to which the people of the community could come to buy and sell articles produced on the farms or in the shop. Doubtless there were fairs and markets held in Lebanon County during the latter part of the 18th century, but little information concerning them is available. In 1809, however, the burgesses of Lebanon, Abraham Deibler and Christian Schnebly, announced a "Jahrmarkt" or Fair. It was to be held on October 23rd and 24th, "when proper stands for salespeople will be put in order to furnish such attractions as are generally to be found at fairs. No gambling for money or money value will be allowed".[147] The latter prohibition was a necessary one in the opinion of the "City Fathers", but it is doubtful whether it lent itself to better enforcement than other laws of a similar nature enacted in the 20th century. For these markets and fairs came to be regarded as something more than a center of buying and selling. Social, political, and economic contacts could be made and renewed. New and fashionable clothes could be seen, envied, and later copied. Romance, too, frequently found a congenial atmosphere at the Annual Fair. As time passed, the limitations placed upon the social activities around the Fair became a subject of complaint. In 1818, the burgesses of Lebanon announced that at the coming Fair, proper "amusements" would be provided for all who attended.[148] The last notice with regard to the Lebanon Fair appeared in the *Libanoner Morgenstern*, May 12, 1827. It

is probable that the service offered by the Union Canal, after its completion and the increase in the number of mercantile houses in the town of Lebanon, made the holding of an annual Fair no longer necessary.[149] There remained, however, the occasional auction, sometimes called markets. Many times these auctions were devoted to the sale of a single article. For example in 1845, some gentlemen of Fredericksburg held a "Horse Market" at which "Horses of every kind" were offered for sale. All who were interested were invited to "try their luck".[150]

In the town of Lebanon itself, the holding of a town-sponsored and regulated market was to wait until 1862, when the council finally enacted an ordinance which established a market to be held four days each week. Prior to that time there was considerable agitation for such a move. Indeed several individuals, in 1857, took it upon themselves to "accommodate" the citizens of Lebanon by holding a market two days per week — John Eley and George Gingrich. The nearly completed Lebanon Valley Railroad would enable them to bring to Lebanon "all the luxuries that city people enjoy, in addition to domestic productions".[151] Once again, the editor of the *Courier*, always progressive and eager to use his columns to advance the interests of the town, urged his readers to encourage this venture in order to "make it permanent".[152] For a time these men seemed to have been successful, but there was definite need for a market that had the support of the town government. Again and again Editor Worth urges the adoption of an ordinance which would establish a town-regulated market. He shows at some length the advantages that would follow such a step — the benefits to the business people of Lebanon, benefits to the farmers, and the increased use of cash instead of credit.[153] Finally, as so frequently happens in small towns, the whole matter of markets entered the political arena in the campaign of 1862. The editor, in appealing for votes for those candidates who were "friends of Lincoln and the Union", wrote that they had adopted the following resolution; "That as the establishment of regular markets in Lebanon would greatly aid the business interests of the place, and be of great convenience and benefit to housekeepers, that the candidates this night nominated be requested, to use all their influence, if elected to secure such markets".[154] Whether or not the "friends of Lincoln and the Union" needed the support of those interested in markets cannot now be known.

There were far more important issues being debated in that year. But the candidates of the "Breckenridgers" were badly defeated in the election, and the victorious "Union" candidates stood pledged to create a town market. To redeem their pledge, they did not lose much time in framing an ordinance of market regulations and enacting it on April 22, 1862. These regulations provided for the renting of stalls at an auction to be held each year on the first Saturday in May. Stalls on the west side of the market house were to be rented to butchers, exclusively, and stalls on the east side to farmers and others. If, however, some stalls on one side remained unrented while there were more applicants than stalls on the other, there could be exceptions made. If all the stalls were rented, and there remained some applicants who could not be cared for, they were to be permitted to back their wagons to the curb to sell their goods. A fee of one dollar was to be charged for this privilege. Tuesday, Wednesday, Friday and Saturday were appointed the regular market days, markets to begin at six o'clock on Tuesday and Friday evenings and close at ten o'clock on Wednesday and Saturday mornings. Storekeepers were not permitted to purchase articles in the market for reselling purposes. A standing committee was to be appointed by the Chief Burgess to have general supervision of the markets and stalls.[155]

In the ensuing auction, all of the stalls on both sides of the market house were sold. The butchers paid from $5.25 to $12.50 per stall annually on the west side, while on the east side, farmers and others paid from $5.05 to $8.70 per stall.[156]

When the market was opened, it was with a "rush", a "large crowd of people" attending. In order further to enliven the occasion, the burgesses had provided a band, which furnished music during market hours. The editor of the *Courier* was proud to state that the sales which were made surprised everyone and that the prices which were received were "exceptionally good".[157]

The market thus got off to an auspicious start, and continued to function well. As time went on, the rules and regulations governing the markets were changed, with the effect of facilitating its use by buyers and sellers alike.[158] Evidently the number of stalls originally provided for were not sufficient, and the demand for space caused several changes to be made in 1864. The committee on markets was authorized in April to establish minimum prices for stalls at the succeeding auction ranging from $5.00 to $60.00. The

regulations concerning the use of curb stands were also stiffened. These stands were to have a frontage of ten feet and were to be regularly auctioned along with the stalls at a minimum rental of $1.00 per year.[159] Then, too, in May, 1864, the Council decided to build a frame addition to the Market House, in order to provide for more stalls.[160]

Thus was provided for the farmers of Lebanon County a local market which greatly assisted them in disposing of their surplus produce, and for the people of the Borough of Lebanon a convenient place in which to procure the necessities of life. It was a mutually advantageous advance for all concerned.[161]

The trade in agricultural commodities of Lebanon County farmers, however, was not entirely limited to the local region. Both in quantity and variety, trade with Philadelphia and to a limited extent with Baltimore was of sufficient importance to be mentioned. As early as the middle of the 18th century farmers of Lancaster County were taking produce to Philadelphia.[162] Wheat and flour were the important articles from the first in this external trade, though later it became more profitable to the Philadelphia merchants to export bread and flour.[163] This change in exports did not affect the demand by the Philadelphia markets for wheat from the interior. Wheat was usually carried to Philadelphia by the farmers themselves, usually in long processions of many teams. "Wheat markets" were also very popular. To these markets, located in or near Philadelphia, came representatives of the merchants to deal with the farmers who congregated there. This method saved the farmer from doing a considerable "shopping around" in order to get the best price possible for his wheat.[164]

Just before the Revolution there was a fear on the part of the Philadelphia merchants that much of this trade with the interior would be shifted to Baltimore. This fear was based on the supposed advantage of the Susquehanna River compared to the overland route to Philadelphia. Writing to Benjamin Franklin on May 3, 1771, Samuel Rhoads expressed the fear that such a change would "reduce us to the situation of Burlington and Newcastle on the Delaware".[165] Likely because of the dire needs of the army during the Revolution, the continued rumors of the building of the Union Canal, and the impracticability of making the Susquehanna River navigable to

Baltimore, the fears of the Philadelphia merchants were never realized. On the contrary, the desires of the up-state farmers of Lancaster and Dauphin Counties, including Lebanon Township, to maintain their commercial relations with Philadelphia are emphasized by the following petition to the General Assembly.

> "That your memorialists stand informed, that repeated applications have been made to the honourable House, for a law to extend the Market House on High Street, still farther westward.
>
> "That it is of great importance to the Farmer to have a ready access with his wagon into the heart of the city; The price of his produce, and the readiness of sale, greatly depend upon it; There he can most easily purchase such goods as he may have occassion for, and best inform himself of the lowest price at which they are sold. While, on the contrary, if he be obliged to remain at the outskirts of the city, there are fewer purchasers for his produce, he is at greater difficulty to obtain what he wants to purchase, and more liable to be imposed on by the few traders who may reside there.
>
> "That High Street, from its great width, is well calculated for accomodating wagons, while they remain in the city; but the other streets are too narrow as to be extremely inconvenient . . . . .
>
> "Your petitioners therefore pray, that until some large open square, near the centre of the trading part of the city, can be obtained for the reception of wagons, the entrance into the heart of the city by High Street, may not be any further interrupted, or prevented, by any means whatever."[166]

Among the signers of this petition are to be found some of the familiar names of Lebanon County, namely, Philip Gloninger, Caspar Stover, John Krause, and Valintin Rank. The final completion of the Union Canal and the building of the Lebanon Valley Railroad bound Lebanon and its environs closely to Philadelphia for the remainder of the period under study.[167]

A reference has been made to the Union Canal. It may be well at this point to give a brief review of the history of this canal which played such an important part in the economic history of the region. It was William Penn who in 1690 first introduced the idea of uniting Philadelphia with the interior by means of a canal which would connect the Schuylkill River with the Susquehanna River. As early as 1770 a survey was made, but the

Revolution cancelled all plans for a time. In 1791 a company was organized and some work was completed, but due to financial embarrassment work was suspended within a few years. Resuming operations in 1821, the canal was finally opened in December, 1827. In 1832 a branch of this canal was opened from Lebanon to Pine Grove, primarily to tap the coal resources of the latter region, but this branch also opened new markets for the agricultural products of northern Lebanon County. With several major changes, including the widening and deepening of the canal, it remained in operation until 1885.[168]

It did not take long for the farmers of the county to use the services of the canal. As early as 1832 Gordon could write that the produce of the county was generally carried to the large store houses on the canal at Lebanon and from there was sent to Philadelphia.[169] From a study of the annual and semi-annual reports issued by the canal office in North Lebanon, it can be observed that throughout the entire period before the Civil War, most of the goods transported on the canal was agricultural. The usual cargoes included flour, grain, lumber, iron, hemp, wool, lime-stone, and iron-ore.[170]

One other phase of agricultural trade must be mentioned. It was the practice of western drovers, bringing livestock such as horses, cattle, and sheep, to eastern markets, to stop occasionally to pasture the animals. Eastern Pennsylvania, including Lebanon County, became a center of this practice. The farmers of the county, who generally had excellent meadows, frequently pastured herds and flocks of several hundred head and more on their land for several days at a time in order to give the animals food and rest. The herds or flocks would then be driven to the New York and Philadelphia markets. Horses raised in the county itself were often bought for the New England and New York markets.[171]

In conclusion it may be said that the farmers of the county participated in both a local and external trade in agricultural products. Such trade not only provided markets for their surplus products from which they received an income, but it also tended to break down their provincialism, a trait often too common with farmers generally.

One criticism frequently levelled at the farmer is that he usually is such an extreme individualist that any attempts toward cooperation or to

attempt to have him radically change his agricultural methods must fail. It has already been noted that, generally speaking, the farmers of Lebanon County at least were not anxious to try new methods of farming. Nor were they very receptive to suggestions made by the editor of the *Courier* from time to time as to the necessity of diversifying their crops, especially the advantages of raising more fruit.[172] In fact it would seem that Editor Worth frequently staged a one-man campaign in his newspaper to arouse the farmers from their lethargy. On one occasion he urged them strongly to buy and read a newspaper. Among the reasons why this was important he said, was that "Farmers are kept advised of the state of the markets, and are, therefore, never to be taken in by speculators . . . ".[173] In 1853 he began a column in his paper called "For the Farmer", a column devoted exclusively to articles dealing with the farm and farm problems.[174]

Another striking instance of the independence and individuality of the German farmers of this county is to be seen in the speech given by the State Senator, John Killinger, on the subject of a "Farmers High School". Killinger opposed the passage of this bill in the Senate "because the farmers of Lebanon County, generally, possess the means and ability to educate their own sons in the science of farming, and would blush to have them educated at the expense of the State, if it were even possible".[175]

Possibly the outstanding proofs of his self-reliant nature and of his disinclination to break away from the habits of his fathers, was the lack of interest shown towards the formation of a county Agricultural Society. While it is true that the town of Lebanon and others of the surrounding towns did conduct annual fairs late in the 18th century and for a time in the 19th century, they in no way represented cooperative action on the part of the farmer. In 1785 the Philadelphia Society for Promoting Agriculture was organized. Perhaps because the work of this society was too "literary" or "philosophical" to appeal to a "dirt farmer", a society of this type was never formed in Lebanon County. But in 1810, due to the influence of Elkanah Watson, an agricultural fair was held in Massachusetts. An important feature of this fair and the others which followed it was the awarding of premiums for the best exhibits. Watson's plan of spreading this type of organization was largely successful until 1825. Then a period of disinterest set in which continued for some fifteen or twenty years. A revival of the movement began

in the forties and continued in some communities into the twentieth century.[176]

It was a society of this latter type which was finally established in Lebanon County. In 1847, the editor of the *Courier* began to urge the importance and usefulness of an agricultural society and to invite his readers to write to him on this subject.[177] This appeal met with no success. In 1851, however, the first State Agricultural Fair was held in Harrisburg. Among the many persons who attended this Fair were quite a few farmers from Lebanon County. Their attendance stirred again the hopes of establishing a society in the county. Letters were written to the newspapers to support such a project.[178] This agitation for a society in Lebanon County began to bear fruit when, in 1855, an organization was effected.[179] "Any citizen of the County of Lebanon or the surrounding counties actually engaged in or feeling an interest in the business of agriculture or horticulture", could become a member by paying an annual contribution of one dollar. Some thirty men associated themselves with this first attempt at organization. Officers were elected, and a constitution was adopted.[180] Then interest waned and no more meetings were held until 1858. In April of that year, the editor of the *Courier*, in urging the necessity of a society, adds the suggestion of one or two Fairs to be held annually, "where a taste for improved breeds of stock would be cultivated, and where every one might gain some ideas useful to him in his occupation".[181] In answer to his appeal, a reorganization meeting was held in May with William Rank presiding.[182] Simeon Guilford was elected President, but he, finding it impossible to serve, was immediately succeeded by Rank who was annually re-elected until 1870 and was in large part responsible for the success of the society. It was at once decided to hold an Annual Fair on October 6, 7, 8, 1858, and a committee on arrangements was appointed. The committee appointed to locate the site for holding the fair leased part of the "Mifflin Estate" on North 8th Street, between Church and Guilford Streets.[183] Trotting and Pacing matches and a Plowing match were scheduled to entertain the crowds. Horace Greeley accepted an invitation to visit the fair and give the principal oration. His remarks, said one report, "gave much satisfaction".[184] Premiums were offered in fourteen classes for the exhibition of cattle, horses and mules, sheep, swine, poultry, farm implements, manufactures, flour, grain, garden vegetables, dairy products, domestic

manufactures, fruit, flowers, and miscellaneous. Due in part to the arrangements made with the Lebanon Valley Railroad, for an excursion to Lebanon from Reading, but more largely due to the energy and efficiency of the committees of the Society, the crowds in attendance and the exhibits "exceeded all expectations". So many people came to the fair, in fact, that the managers decided to continue it for an extra day.[185] In a letter to the editor, one who had attended grew quite lyrical in describing his reaction to it. "It was", he wrote, "like the fair and blooming young mother's golden haired, laughing-eyed and smiling-faced first born. It was Lebanon's first offering of the kind to the mighty spirit of progression, and a noble one it was, too."[186]

Thus the fair became an annual part of the program of the Society, being held regularly until 1864 when circumstances beyond the control of the Society forced its abandonment for several years. But in this way, before the Civil War, was established one of Lebanon County's familiar institutions—the fair—which was to continue, with few interruptions until well into the twentieth century.

By way of summary it may be said that the development of agriculture and agricultural methods in Lebanon County prior to 1840 was not revolutionary. It was, rather, a period of beginnings and of preparation. Farmers were at a disadvantage because of the lack of good means of communication and transportation, the absence of a good credit system and because of the limitations of traditionalism and ideas of self-sufficiency. In the twenty years before the Civil War, 1840-1860, the farmers of this county participated in the general efforts to reorganize agriculture in the eastern United States, although sometimes their participation was somewhat tardy. Along with the increased use of farm machinery, the farmers were also finding new markets due to improved transportation facilities and were making strides towards a specialized rather than an extensive farm program.[187]

NOTES

1. An excellent example is to be found in the *Lebanon Courier*, August 19, 1853, a letter to the Editor.
2. Rush, Account of the German Inhabitants of Pennsylvania, in Pennsylvania-German Society *Proceedings*, XIX, 72-73.
3. Bidwell and Falconer, *History of Agriculture in the Northern United States. 1620-1860*, 115.
4. *Ibid.*, 72-73.
5. *Pennsylvania Archives*, Third Series, XVII, 134-145.
6. *Ibid.*, 791-806.
7. Cazenove, *Journal*, 47.
8. *Ninth Census*, (1870), III, 361.
9. Jameson, *The American Revolution as a Social Movement*, 63.
   Gordon, *Gazetteer of Pennsylvania*, Part II, 238-239.
10. *Lebanon Courier*, 1861, *passim*.
11. Michaux, F. A., *Travels*, in Thwaites, *Early Western Travels*, III, 134; Mittelberger, *Journey to Pennsylvania*, 30; *Pennsylvania Magazine of History and Biography*, I, 42.
12. Quoted by Bidwell and Falconer, *op. cit.*, 122-123; Watts, *The Pennsylvania Barn* contains some very excellent drawings of barns.
13. *Lebanon Courier*, May 3, 1850.
14. Bidwell and Falconer, *op. cit.*, 9-10; Pastorius, "Pennsylvania"; in Myers, A.C., *Narratives*, "Also one cannot, the first year plant either rye or wheat in such new land, but only Indian corn.
15. Bidwell and Falconer, *op. cit.*, 18.
16. *American Husbandry*, I, 157.
17. Schoepf, Travels Through Berks County in 1783, in *Pennsylvania Magazine of History and Biography*, V, 76.
18. Rush, *op. cit.*, 62. Rush mentions here a practice which was not uncommon late in the nineteenth century as well as earlier. The cash value of the wheat crop of the farm was frequently set aside for the payment of both the interest and the principal of the farmer's indebtedness. In one instance to the writer's knowledge, a farmer who was "hired out" as a young boy to a neighboring farmer in Lebanon County, eventually was permitted to buy the farm with the proviso that the mortgage be paid off from the proceeds of the wheat crop. After carefully farming the land and conscientiously setting aside the cash returns from his wheat crop, he succeeded in retiring the mortgage. Then, using the same method, he secured an adjacent farm for his elder son. Still later both the farmer and older son used this method to secure a farm for the younger son. In two generations then, this family, which had the most humble of origins, came to own three large farms in Lebanon County by the simple but highly effective means of using the cash value of the wheat crop specifically for the purpose of acquiring land.
19. Gordon, *op. cit.*, Part II, 238.
20. *Lebanon Courier*, July 5, 1855.
21. Rush, *op. cit.*, XIX, 58.
22. John Penn's Journal — A Trip to Reading, Harrisburg, Carlisle, Lancaster in 1788, in *Pennsylvania Magazine of History and Biography*, III. On April 13, 1788, he wrote "Several trees, before I arrived at the Susquehanna ferry, had been girdled . . . that is cut all around thro' the bark, so as to prevent their continuing alive".
23. Bidwell and Falconer, *op. cit.*, 79.
24. *Animal Husbandry*, I, 173.
25. *Ibid.*, I, 171-172; Schoepf, J. D., *Travels in the Confederation, 1783-1794*. Translated by A. J. Morrison, I, 130.
26. *Animal Husbandry*, I, 158.

27. Rank, William, Diary, 1851-1881. The names of the fields were: "Hill Field", "No. 2", "No. 3", "Cherry Field", "Meadow", "Barn Field", "Old Orchard".
28. *Ibid.*, *passim*.
29. *Ibid.*, the first recorded use of clover seed on the Rank farm was in "Old Orchard" field in 1863.
30. *Ibid.*, December, 1862.
31. See below.
32. The advantages of such comparisons was one of the points stressed for its need.
33. *Animal Husbandry*, I, 81.
34. Rogin, *Farm Machinery in Relation to Labor*, 192.
35. Albert, A. H., Diary, 1867; Rank, Diary, 1873.
36. Rogin, *op. cit.*, 204-208.
37. *Ibid.*, 33-34.
38. *Lebanon Courier*, August 22, 1851.
39. *Ibid.*, February 28, 1861.
40. *Ibid.*, October 8, 1845; *Lebanon Advertiser*, June 19, 1850.
41. An entry in the Diary of A. H. Albert, 1869, shows that until that date the cradle was used exclusively to harvest grain.
42. *Lebanon Courier*, May 18, 1854.
43. Rank, Diary, 1870; Albert, Diary, April, 1869. The writer of the article "Forty Years in the Printing Office" stated that he remembered that as a boy, around 1859, the cradle had supplanted the sickle and the scythe in Lebanon County; that he recalled riding around the threshing floor on a horse "and leading two others after him".
44. Rogin, *op. cit.*, 157-160; Albert, Diary, February 2, 1867, "Thrashed corn with the horses, raked out cobs, ready for cleaning".
45. Albert, Diary, *passim*; On February 2, 1867, he recorded, "I and Yingst thrashed rye with flail".
46. Bidwell and Falconer, *op. cit.*, 297-299.
47. Rogin, *op. cit.*, 164.
48. *Ibid.*, 182-185.
49. Cornwall Furnace Journal, 1841-1848. March 31, 1845.
50. *Ibid.*, January 31, 1851 and *passim*.
51. *Ibid.*, July 7, 1864.
52. *Ibid.*, July 27, 1855.
53. Rank, Diary, *passim*.
54. *Ibid.*, 1875; Albert, Diary, 1860.
55. Rank, Diary, 1862.
56. Pennsylvania State Board of Agriculture, *Report*, 1880, 219.
57. Rogin, *op. cit.*, 176-177.
58. *Lebanon Courier*, November 20, 1847.
59. *Compendium of the Sixth Census*, 1840.
60. Census of 1860, in *Lebanon Courier*, May 18, 1865.
61. *Ninth Census*, (1870), III, 232-235.
62. *Compendium of Sixth Census*, 1840.
63. Census of 1860, in *Lebanon Courier*, May 18, 1865.
64. *Ninth Census*, (1870), III, 232-235.
65. *Lebanon Courier*, April 21, 1847.
66. *Ibid.*, July 16, 1852.
67. *Ibid.*, July 30, 1852.
68. *Ibid.*, June 15, 1854, Letter to the Editor, C.E.H. to T.T. Worth, Fort Wayne, Indiana.
69. *American Husbandry*, I, 154-155.
70. Schoepf, *op. cit.*, in *Pennsylvania Magazine of History and Biography*, V, 75-76.
71. Bidwell and Falconer, *op. cit.*, 327-336.

72. *Compendium of Sixth Census*, 1840.
73. Census of 1860, in *Lebanon Courier*, May 18, 1865.
74. *Ninth Census*, (1870), III, 232-235.
75. *Lebanon Courier*, May 20, 1853.
76. Cited by Bidwell and Falconer, *op. cit.*, 96-97.
77. *Lebanon Courier*, June 4, 1863.
78. *Compendium of Sixth Census*, 1840.
79. Census of 1860, in *Lebanon Courier*, May 18, 1865.
80. *Ninth Census*, (1870), III, 232-235.
81. Census of 1860, in *Lebanon Courier*, May 18, 1865.
82. *Ibid.*, April 23, 1854.
83. *Ibid.*, June 16, 1854.
84. *Ninth Census*, (1870), III, 232-235.
85. *Compendium of Sixth Census*, 1840.
86. A visitor to the county in 1850 wrote to the editor of the *Courier* that although the barns in Lebanon County were fine, the farmers had not shown much interest in the cultivation of choice fruit. He was glad to notice some improvement, recently, in that direction. *Lebanon Courier*, August 2, 1850. Exceptions to this general disregard for fruit cultivation may be seen in several advertisements of farms for sale, in which the owner stresses the advantages of his orchards. See for example an advertisement in the *Libanoner Morgenstern*, July 10, 1811.
87. Letter to the Editor stressed the advantages of raising apples. *Lebanon Courier*, February 10, 1849.
88. *Ibid.*, November 27, 1857. It should also be noted that when the Fruit Growers Association of Eastern Pennsylvania met in Reading, Pennsylvania, in February, 1861, Samuel Miller of Lebanon was elected Vice-President of the Association. *Ibid.*, February 14, 1861.
89. *Lebanon Advertiser*, August 14, 1850.
90. See for example the advertisement of D. Karmany, in the *Lebanon Courier*, August 6, 1845.
91. *Ibid.*, January 16, 1862.
92. Census of 1860, in *Lebanon Courier*, May 18, 1865; Ninth Census, (1870), III, 232-235.
93. Acrelius, Israel, *History of New Sweden, or Settlements on the River Delaware*, Historical Society of Pennsylvania, Memoirs, XI, 154.
94. Watson, *Annals of Philadelphia*, II, 66.
95. Census of 1860, in *Lebanon Courier*, May 18, 1865; *Ninth Census*, (1870), III, 232-235. These figures raise a question which available evidence does not answer. Did the decline in seed production mean that there was also a decline in the number of acres planted in clover; or did the decline take place because the available land was well-planted in clover, which the farmer were planting, not for the seed but for hay and pasturage? Since a clover field will re-seed itself, the latter question might be answered in the affirmative. But then how account for the repeated urgings of Editor Worth to raise more clover, and how account for the high price of clover seed?
96. *Lebanon Advertiser*, June 18, 1851.
97. Census of 1860, in *Lebanon Courier*, May 18, 1865; Ninth Census, (1870), III, 232-235.
98. *American Husbandry*, I, 165.
99. *Laws of the General Assembly of Pennsylvania Passed at the Session* 1836-37, 222-229.
100. *Compendium of Sixth Census*, 1840. After the outbreak of the Civil War, the sources of sugar were, of course, cut off from the North. Some attempts were made to produce sorghum to take its place, since the raising of sugar beets was not yet on a satisfactory basis. Again the Editor of the *Courier* took up the refrain in an editorial urging the farmers of the county to raise sorghum, claiming that the product per acre was "large and profitable" since sugar and molasses would likely

continue to increase in price. *Lebanon Courier*, April 14, 1864. No evidence remains, unfortunately, to show whether or not the farmers undertook the cultivation of this plant.

101. Rank, Diary, May 27, 1851; June 6, 1867, etc.
102. Bidwell and Falconer, *op. cit.*, 18.
103. *Ibid.*, 20.
104. *Ibid.*, 445.
105. *Ibid.*, 31, 111; *American Husbandry*, I, 156.
106. *Pennsylvania Archives*, Third Series, XVII, 135-143.
107. *Ibid.*, 791-802.
108. Bidwell and Falconer, *op. cit.*, 398.
109. *Compendium of Sixth Census*, 1840; Census of 1860, in *Lebanon Courier*, May 18, 1865; *Ninth Census*, (1870), III, 232-235.
110. *U. S. Patent Office Report*, 1845, *Agriculture*, 337, cited by Bidwell and Falconer, *op. cit.*, 395.
111. *Lebanon Courier*, 1848-1860, *passim*; April 15, 1848.
112. *Pennsylvania Archives*, Third Series, XVII, 135-143.
113. *Ibid.*, 791-802.
114. *Compendium of Sixth Census*, 1840.
115. Census of 1860, in *Lebanon Courier*, May 18, 1865.
116. *Ninth Census*, (1870), III, 232-235.
117. *Lebanon Courier*, March 2, March 9, 1855.
118. *Ibid.*, March 21, 1856.
119. *Ibid.*, March 7, 1861.
120. *Compendium of Sixth Census*, 1840.
121. Census of 1860, in *Lebanon Courier*, May 18, 1865.
122. *Ninth Census*, (1870), III, 232-235.
123. *Lebanon Courier*, December 16, 1848.
124. *Ibid.*, December 23, 1848.
125. *A Statistical View of the Number of Sheep*, etc., 100-101.
126. Bidwell and Falconer, *op. cit.*, 412. In these decades sheep for southeastern Pennsylvania were purchased from western drovers in the fall and fed during the winter season.
127. *Compendium of Sixth Census*, 1840.
128. *Lebanon Courier*, March 21, 1856.
129. *Ibid.*, August 12, 1848 and many others. In the issue of December 9, 1848, the editor thought it necessary to summarize the law concerning "strays"; anyone taking up a stray must notify the Town Clerk within four days under penalty of five dollars. If the owner appeared and disagreed as to the charges for keeping the stray, the matter had to be referred to a Justice of the Peace. If, on the other hand, the owner did not appear within ten days and six days from the time of the notice to the clerk, the same must be advertised in one paper in the county. Then if the owner did not appear within sixty days, application had to be made to the Justice of the Peace who then issued a warrant to the Constable to sell the stray. If notice was not given, the stray had to be surrendered to the owner without any fee or reward.
130. Richard Peters to George Washington, 1792, in *Letters on Agriculture* (Knight Edition), 84.
131. *Lebanon Courier*, June 30, 1854.
132. Rank, Diary, *passim*.
133. Albert, Diary, 1867.
134. *Lebanon Courier*, January 8, 1845.
135. *Ibid.*, July 20, 1855.
136. Notice of the Supervisors of Cornwall Township, *Lebanon Courier*, April 11, 1861.
137. Rank, Diary, 1863. Albert, Diary, *passim*. In 1870, however, Albert recorded, "Paid road tax, $18.98".

138. As late as January 6, 1880, Albert recorded in his Diary, "William Weiler was here. We settle our accounts for the year 78 and paid him in full. Balance $3.85".
139. Journal of a Lebanon Storekeeper, 1794-1804, *passim*. Lebanon County Historical Society.
140. Account Books of Daniel Hoffman, 1843-1849; 1860-1862. These books were examined through the courtesy of Miss Katherine Hoffman, Lebanon.
141. *Libanoner Morgenstern*, October 10, 1818.
142. *Lebanon Courier*, November 27, 1819.
143. *Ibid.*, September 1, 1849.
144. *Ibid.*, December 8, 1849. See also advertisement of Shirk, Gerhart, and Meily, *ibid.*, April 12, 1850; also that of David Hoffman, *ibid.*, April 12, 1850.
145. *Ibid.*, November 19, 1852.
146. Advertisement of Uhler and Raber, *Lebanon Courier*, April 3, 1847; see also that of Uhler and Conrad, *ibid.*, September 17, 1845. In 1844 the editor of the *Courier* advertised for a load of "Chips" or "Corn Cobs" and in return offered a subscription to his newspaper, *ibid.*, December 25, 1844. As late as 1870, Albert settled "with Jacob Kohr for coal by giving him 30 bu. of corn at 75c and 84½ bus. oats. Makes all square for coal account". Diary, April 8, 1870.
147. Schmauk Ms., Lebanon County Historical Society. Copied from the *Libanoner Morgenstern*, October 3, 1809. See also *ibid.*, May 15, 1811. In that year the fair was held on May 23 and 24.
148. *Libanoner Morgenstern*, October 10, 1818; October 21, 1825.
149. Harrisburg and Lancaster abolished their fairs in 1816. *Laws of Pennsylvania*, 1816.
150. *Lebanon Courier*, February 5, 1845.
151. *Ibid.*, July 17, July 24, 1857.
152. *Ibid.*, July 3, 1857.
153. See for example, the editorials in the *Courier*, January 2, 1862; February 27, 1862. Letters to the Editor praised him for the stand he took and urged him to continue the fight, *ibid.*, January 9, 1862.
154. *Ibid.*, March 20, 1862.
155. *Laws and Ordinances of Lebanon Borough*, 1821-1871, 48-50.
156. *Lebanon Courier*, May 8, 1862.
157. *Ibid.*, May 15, 1862.
158. An Ordinance passed on June 10, 1863, prohibited the sale of goods before 4:00 o'clock from April 1 to September 1, and before 5:00 o'clock from September 1 to April 1. *Laws and Ordinances of Lebanon Borough*, 1821-1871, 51.
159. *Lebanon Courier*, April 14, 1864.
160. *Ibid.*, May 5, 1864.
161. An interesting comment made toward the close of the Civil War shows the extent to which the war had drained the county of its agricultural produce. In urging his readers to be present at the opening of the market, he adds, "It is a pity and a wonder that in a place like Lebanon, surrounded as it is by one of the first agricultural counties in the world, that there should be a scarcity of almost everything the housekeeper requires". *Ibid.*, March 30, 1865.
162. Eggleston, *Husbandry*, 440.
163. Hanna, *Trade in the Delaware District*, 250.
164. The Pennsylvania-German Society *Proceedings*, XIX, 67-68.
165. *Pennsylvania Magazine of History and Biography*, XIX, 69.
166. Shenk, H. H., Lancaster County Petitions, Etc., To the Supreme Executive Council, 1784-1790, in *Papers Read Before the Lancaster County Historical Society*, XXV, No. 5, 1921. Again in the decade before the Civil War, the newspapers of Philadelphia complained that the people of the interior counties of Pennsylvania were not supporting the interests of that city. By way of reply, the editor of the *Courier* wrote that if that charge were true, the Philadelphia merchants had themselves to

blame because for many years these merchants had not shown any interest in the interior counties. Let Philadelphia get busy, he wrote, and instead of "expending all her bows, her courtesies, and her encouragements to gain southern trade, let her remember the teeming millions of the Old Keystone . . . ". Later the editor wrote that his editorial had been favorably commented upon by the *Philadelphia Inquirer*, and the *Philadelphia Ledger*. Worth's editorial appeared in the *Courier*, June 2, 1857, and that it was not without results is to be noticed by the increased number of advertisements of Philadelphia merchants appearing in the Lebanon newspapers after the editorial was written. *Lebanon Courier*, June 26, 1857; July 3, 1857; August 7, 1857, etc.

167. *Lebanon Courier, passim;* see also, for example, a letter of Alex. Graydon to Jedidiah Morse, Louisbourg (Harrisburg) March 5, 1789, in *Pennsylvania Magazine of History and Biography*, VI, 115; also Christian Snavely to John Wetherill, Lebanon, August 29, 1809, in which Snavely, a Lebanon merchant, ordered glue, and red lead. Pennsylvania Counties, Miscellaneous Manuscripts, Historical Society of Pennsylvania.

168. The Union has had several historians. See especially, Theodore B. Klein, *The Canals of Pennsylvania, With Special Reference to the Union Canal*. The *Papers* of the Lebanon County Historical Society contain many references to it. Rev. J. G. Francis, The Union Canal, XI, No. 5 (1939), is the most recent writer on the subject of the canal.

169. Gordon, *op. cit.*, Part II, 238.

170. *Lebanon Courier, passim*, 1836-1865. In 1850, for example, 10,613 tons of iron and 6,095 tons of iron ore were shipped over the Canal route, while in 1857, 24,973 tons of iron, and 82,265 tons of iron ore were transported. See *Annual Report of the Managers of the Union Canal Company*, 1851, 1858.

171. Rank, Diary, August 9, 1855, September 24, 1863; Albert, Diary, June 10, 1871; *Lebanon Advertiser*, July 31, 1850; February 25, 1858; *Lebanon Courier*, July 27, 1855, May 25, 1865, etc. Poultry was also sent to the Philadelphia markets from Lebanon County, *Lebanon Courier*, January 14, 1853. Rank pastured as many as seven and eight hundred head of sheep on his farm at one time, Diary, July 4, July 8, 1855.

172. *Lebanon Courier*, February 27, 1847. For the advice of the editor to the farmers to plant sorghum, see *ibid.*, April 14, 1864.

173. *Ibid.*, January 7, 1846.

174. *Ibid.*, January 21, 1853.

175. *Ibid.*, April 10, 1857.

176. For a comprehensive bibliography of the history of Agricultural Societies in the United States, see E. E. Edwards, *A Bibliography of the History of Agriculture in the United States*, 215-217.

177. *Lebanon Courier*, November 13, 1847.

178. One of the best of these letters was written to the editor of the *Lebanon Advertiser*, who reprinted it in the issue of November 26, 1851.

179. *Lebanon Courier*, April 6, April 20, May 25, June 1, 1855.

180. *Ibid.*, June 1, 1855.

181. *Ibid.*, April 30, 1858.

182. *Ibid.*, June 4, 1858; Rank, Diary, 1858.

183. Lebanon County Historical Society, *Papers*, VIII, 243; *Lebanon Courier*, July 30, 1858.

184. *Ibid.*, October 15, 1858.

185. *Ibid.*, October 15, 1858.

186. *Ibid.*, October 15, 1858. "Cassio" to the Editor, Annville, October 12, 1858.

187. For an excellent discussion of the changes which took place in eastern agriculture in the period 1800-1840 and 1840-1860, see Bidwell and Falconer, *op. cit.*, 254-256; 448; 450-451.

THE LEBANON COUNTY
HISTORICAL SOCIETY

THE RISE OF AN IRON COMMUNITY

AN ECONOMIC HISTORY OF LEBANON COUNTY, PENNSYLVANIA FROM 1740 TO 1865

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CHAPTER IV

"BIG HILL, MIDDLE HILL AND GRASSY HILL"

"It is not probable that the natives of America worked iron in any way for practical uses before the white man came. Certain tribes on different parts of the continent used the reddish oxide as pigments for their war paints; frequently meteors fallen from the sky were beaten into objects of worship; and occasionally small, loose pieces of hematite were made into symbols of good luck. But the scattered masses of iron ores remained, as in ages past, untouched."[1]

While New England led the way in the manufacture of iron in the American Colonies in the seventeenth century, Pennsylvania by the middle of the next century had assumed the leadership of that industry. The Dutch and Swedes who had preceded William Penn on the banks of the Delaware did not establish any iron industry, but relied upon iron imported from Europe for their needs.

In the second decade of the eighteenth century the manufacture of iron in Pennsylvania was undertaken in the Schuylkill Valley. In 1716, Thomas Rutter built a bloomery forge in what is now Berks County. Following this beginning, the industry spread rapidly. Soon forges and furnaces were erected in what is now the State of Delaware, and what is more pertinent to this study, to the Susquehanna Valley of Pennsylvania. In this valley, the industry was centralized in such regions as Lancaster, York, and Lebanon.[2]

The first to be established in the Susquehanna Valley was Kurtz' Iron Works, built about 1726 on the Octorora Creek. But the industry made little progress until the erection of Cornwall Furnace by Peter Grubb in 1742. It was from the operations of this furnace that the iron industry of the Lebanon Valley developed. Cornwall Furnace was not only the beginning, but for a long period, it remained the back-bone of the iron industry in this section.

As essential as agriculture is to the economic development of Lebanon County, the iron industry has been even more important in the ways in which it has affected the lives of the people of the county.

From the time of the first settlements in the eighteenth century, farming has been the principal occupation of most of the inhabitants. Owing to this reliance which for so long a time was placed upon agriculture, capital, which was only slowly amassed, tended to be used in acquiring more land, thus strengthening the position which agriculture held in the county. The thoughts of the people, too, were constantly being directed toward a greater production of agricultural products and toward more varied farm practices and crops, rather than toward industrial organization and production.

To an increasing extent, however, and especially after the fourth decade of the nineteenth century, the economic tone of the county was to be determined by the prosperity or depression of the iron industry.[3] When the furnaces were in full blast, when the forges were busy, when the casting floors were full, not only were the iron workers of the county assured of their weekly or monthly wages; these wages, in turn, assured the local merchants that there would be a demand for their goods, the farmers were assured of their local markets, and the shoemakers, tailors, and other local artisans had no difficulty in disposing of their products and wares. When, on the other hand, employment in the iron industries was slack, or what was even worse, when furnaces were "blown out" for lack of orders, when the casting beds were empty, the economy of the entire county was adversely affected.

During the century and a half in which the iron industry in its mining and manufacturing phases was being developed by local men and local capital, it passed through two rather distinct periods of development. The earlier period, lasting from about 1740 to 1840, was characterized by small furnaces and forges, individually owned and operated or owned and operated by several members of one family. Total production was not large and expansion was slow. For the most part, the products of these furnaces and forges were made for the local trade and were sold directly to the ultimate consumer. Cornwall Furnace, for example, sold most of its pig iron to forges and furnaces in the vicinity. In 1776, most of the pig iron was sold to George Ege at Charming Forge, Berks County, Nicholas Shroff, Daniel Hollinger, and Daniel Bryans at Hopewell Forge, Lancaster County, and to William Alexander at Codorus

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Forge, York County. In 1830, while the number of customers for Cornwall iron had increased, they were still located in the same area as in 1776. Those to whom iron was sold included Samuel Jacobs at Spring Grove, Edward Davies at Pool Forge, Robert Jenkins at Windsor Forge, the Martick Works, and James Sproul at Sadsbury Forge, all of Lancaster County; Benjamin Mooney at Speedwell Forge, the Weidman's at Union Forge, both in Lebanon County; and John Caldwell at Rock Forge in Berks County.[4]

The second period of development was marked by the establishment of a greater number of industries of a more varied nature. In a ten year period just prior to the outbreak of the Civil War, 1848 to 1857, there were as many iron manufacturing establishments put into operation as had been established during the preceding century.[5] This period also witnessed the forming of companies of men as the owners of the enterprises rather than individuals, though the Coleman family continued to dominate the industry. Also to be noticed in this period was the employing of men not included among the owners to manage the several plants. Production increased tremendously, more men were employed, and the iron industry became the most important industry of this entire region.

During this second period of development, the products of Lebanon County furnaces and forges were sold to a more diversified group of consumers located at more distant points than had previously been reached. By 1860, Cornwall Furnace was overshadowed by the erection of larger furnaces in the county. In spite of this, however, the owners of Cornwall were selling pig iron not only to several forges in the surrounding counties, but also to the Harrisburg Car Company at Harrisburg, Pennsylvania, and to the Philadelphia and Reading Railroad Company. Cabeen and Company of Philadelphia was acting as agent for the Furnace at this time.[6]

For more than a century the foundation of this important industry was the source of the iron ore itself rather than the furnaces, forges, and mills which used the ore. These latter owed their existence altogether to the fortunate fact that Cornwall with its fabulous store of ore was in the immediate vicinity, as was an abundant supply of wood, limestone, and, later anthracite coal, all essential ingredients for a successful iron industry.[7]

"Girard", in the *Philadelphia Inquirer*, June 13, 1940, stated the case well. "Rich as have been its thousands of smiling acres", he wrote, "and

large as were its harvests, the biggest single event in Lebanon's annals was the discovery of three green hills. Big Hill, Middle Hill, and Grassy Hill, all within quarter of a mile area, comprised what for a century was the world's greatest iron mine."

Writing eighty years prior to this date, the editor of *The Press* in Philadelphia, also characterized Cornwall in glowing fashion. "The Cornwall ore hills, situate about five miles South of the town of Lebanon, are the principal attraction of the valley, and is, perhaps, the richest deposit of ore within the same compass in the country. The Cornwall hills are truly a mineral and geological curiosity, well worth a ride from Philadelphia to behold."[8]

The history and the development of the ore hills at Cornwall have been the subject of many articles and addresses.[9] Interest in them has not waned in the more than two hundred years that have passed since their discovery. Historians, geologists, economists, antiquarians, and genealogists have written on many phases of the subject. It is well that they have, for the subject is an interesting one, one that permits many different approaches and interpretations. In an economic history of Lebanon County, the "hills" are indispensable, since without them the iron industry, which was the foundation of most of the industry of the county before the Civil War, would scarcely have developed. The exact time of their discovery and the individual who discovered that this section of the South Mountains contained deposits of iron ore will probably never be known. It was Peter Grubb, however, who first profitably used the ore and who first developed the ore hills.

Peter Grubb was born at Grubb's Landing, near Wilmington, Delaware on the Delaware River. He was the son of John Grubb, a native of Cornwall, England, who came to this country in 1692. Peter Grubb died, intestate, in 1754, leaving two sons, Curtis Grubb and Peter Grubb, jr.[10]

These ore hills lie in the South Mountains, five miles south of the city of Lebanon. Much of the ore is exposed and large amounts of ore lie close to the surface. So from the beginning mining operations were relatively easy and far less expensive than in mines where shafts and tunnels had to be dug. The exposed part of the ore centered about three hills, ranging in an east-west direction, and named "Big Hill", "Middle Hill", and "Grassy Hill". Their situation is somewhat unusual, since they were located in

very rich and fertile farm country and not, as might be expected in a rugged, inaccessible area. The forests of which they were a part, served as the source of charcoal for the furnaces in the surrounding area. Then, too, they were entirely surrounded by limestone, so essential in the smelting of the ore, and within thirty miles of the anthracite coal fields which was to be of advantage when anthracite succeeded charcoal as fuel. Finally, the valleys between the hills were cut by streams of water which furnished the power to operate the furnaces until the advent of the steam engine. It is difficult to over-estimate the economic importance, not alone of the ore hills themselves, but also of the strategic location which they had. They were indeed the "peculiar feature" of the Lebanon Valley.

Visitors have always been impressed by the ore hills, not alone because of the size of the hills and the amount of ore already produced, but also because of the apparently limitless amount of ore still to be removed. In "A History of New Sweden", Acrelius wrote that these hills were "rich and abundant" in ore.[11] In 1789, Alex. Graydon wrote to Mr. Jedidiah Morse, "Conewago Hill, in which there is a mine of Iron Ore belonging to the Estate of the late Mr. Grubb . . . appears to be inexhaustible".[12] In 1847, after a visit to Cornwall, "J.F." wrote to the editor of the *Norristown Herald* that even though eight or ten furnaces have obtained their ore here for more than one hundred years, they "have scarcely made an impression".[13] J. P. Lesley, State Geologist, wrote in 1892, "the great magnetic iron ore mine of Cornwall, in Lebanon County is unique in its character, standing alone in the geology of the State, and pouring year after year its flood of wealth into the business world. Worked for more than fifty years [*sic*] it shows no sign of exhaustion; on the contrary, its annual output continually swells in volume".[14]

There have been several serious attempts to estimate the total amount of ore taken from these hills. No figures, however carefully they may have been arrived at, can be entirely accurate, for there were no exact records kept of mining operations before 1848. Through the use of the "Blast Books" of furnaces known to have used Cornwall ore, though, an estimate of the ore mined can be made, but even such amounts are open to question since many of the "Blast Books" have been destroyed. Mr. Henry C. Grittinger, at one time Superintendent of the North Cornwall Furnaces, and for many years identified with the Coleman interests, has estimated the total number of

tons of iron ore mined at Cornwall from 1742-1900 as 15,582,171 tons. In an interesting compilation of figures, he divided this period of time in the following manner: 1742-1790; 1790-1848; 1848-1864; 1864-1900. In the earlier periods, before records of mining operations were separately kept, he allowed each furnace using Cornwall ore 2,000 tons per year on the assumption that since each furnace made on the average 1,000 tons of pig iron annually and since each ton of pig iron required on an average two tons of ore, each furnace therefore used 2,000 tons of ore from the ore hills. After 1848, records are available to show the exact amount of ore removed. The following table, made by Mr. Gerringer, shows how he arrived at the above-stated number of tons of ore, though he himself stated that the allowance of 2,000 tons per annum per furnace was "liberal".[17]

Cornwall Furnace	1742-1790, 48 years	96,000 tons
Elizabeth Furnace	1750-1790, 40 years	80,000 tons
Mt. Hope Furnace	1785-1790, 5 years	10,000 tons
	Total	186,000 tons
Cornwall Furnace	1790-1848, 58 years	116,000 tons
Elizabeth Furnace	1790-1848, 58 years	116,000 tons
Caledonia Furnace	1791-1848, 57 years	114,000 tons
Mt. Hope Furnace	1790-1803, 13 years	26,000 tons
Mt. Hope Furnace	1821-1848, 27 years	54,000 tons
Reading Furnace	1794-1848, 54 years	108,000 tons
Mt. Vernon Furnace	1801-1814, 13 years	26,000 tons
Mt. Vernon Furnace	1844-1848, 4 years	8,000 tons
Annaba Furnace	1817-1848, 11 years	22,000 tons
	Total	590,000 tons

Quantity of Ore mined from 1848 to the formation of the Cornwall Ore Bank Company, February 1, 1864 — 1,524,908 tons

Quantity of Ore mined from February 1, 1864 to January 1, 1900, 11,281,263 tons

Recapitulation

Quantity of Ore mined prior to 1790	186,000 tons
Quantity of Ore mined from 1790-1848	590,000 tons
Quantity of Ore mined from 1848-1864	1,524,908 tons
Quantity of Ore Mined from 1864-1900	13,281,263 tons
Grand Total	15,582,171 tons

By using a less accurate method, in his *Progressive Pennsylvania*, Swank arrived at the grand total of 20,366,696 tons of iron ore produced from 1740 to 1908.[16]

Periods	Tons
From 1740 to 1790, three furnaces, each 2,000 tons yearly, about	300,000 tons
From 1790 to 1848, six furnaces, each 2,000 tons yearly, about	700,000 tons
From April 1, 1848, to January 1, 1853	173,190 tons
From January 1, 1853, to February 1, 1864, (date of formation of Cornwall Ore Bank Company) the shipments amounted to	1,351,717 tons

From February 1, 1864, to the end of 1907 the shipments were as follows:

Years	Gross Tons	Years	Gross Tons	Years	Gross Tons
1864	165,915	1879	268,488	1894	371,710
1865	114,802	1880	231,172	1895	614,598
1866	216,659	1881	249,050	1896	463,059
1867	202,755	1882	309,680	1897	419,878
1868	165,843	1883	363,143	1898	584,342
1869	173,428	1884	412,319	1899	763,152
1870	174,407	1885	508,864	1900	558,713
1871	176,054	1886	688,054	1901	747,012
1872	193,317	1887	667,210	1902	594,177
1873	166,782	1888	722,917	1903	401,469
1874	112,429	1889	769,020	1904	174,331
1875	98,924	1890	686,302	1905	617,060
1876	137,901	1891	663,755	1906	763,788
1877	171,588	1892	634,714	1907	704,004
1878	179,299	1893	439,705		
				TOTAL	20,366,696

Whatever else may be said with respect to the accuracy of these figures, they do represent a rough estimate of the tonnage of iron ore which had been removed from the Cornwall deposits up to the beginning of the twentieth century. Since the local furnaces were almost entirely dependent upon Cornwall ore, the growth of the iron industry of the Lebanon region can be readily traced in the increased amounts of iron ore mined, and the fundamental position of Cornwall in the industrial growth of the Lebanon Valley is rather clearly revealed.

The history of the changes in ownership of the Cornwall Ore Hills is a very complex history, and has been adequately worked out in several publications.[17] By way of summary it may be noted here that Peter Grubb secured in several ways from 1734 to 1737 the land which included the iron deposits. On May 8, 1732, John, Thomas, and Richard Penn had conveyed by warrant a tract of land, including the ore hills, to Joseph Turner of Philadelphia. Turner, on April 5, 1734, assigned this tract to William Allen. On this same day of April, Peter Grubb bought 300 acres of this land from Allen for the sum of £135. On November 2, 1734, he was granted a warrant to a tract of land consisting of 195 acres. Finally, he was granted a warrant to two tracts of land, totalling 142.5 acres on December 2, 1737. All of these tracts were adjoining. When Peter Grubb died, intestate, in 1754, all of his property was divided between his two sons, Curtis and Peter Grubb. Curtis, who was the elder of these two sons, received two-thirds, and Peter, the younger, received one-third of the estate. On June 28, 1783, Curtis Grubb conveyed to his oldest son, Peter, one-sixth of all his lands, and one-sixth of the Cornwall ore hills.

Shortly thereafter, on September 26, 1785, articles of agreement were entered into between "Peter Grubb, ironmaster, Heidelberg Township, Berks County, now Lebanon and Robert Coleman, ironmaster, Elizabeth Township, Lancaster County," by which Grubb, in consideration of £8500 gold or silver, lawful money of Pennsylvania, covenanted on or before May 1, 1786, to grant to Coleman the above mentioned one-sixth interest in the Cornwall property. The conveyance was actually made to Robert Coleman on May 9, 1786, except that Peter Grubb reserved the right of "digging, raising, and hauling away a sufficient quantity of iron ore for the supply of any one furnace at the election of the said Peter Grubb, his heirs and assigns, at all times hereafter".[18]

Thus did the magic name of Coleman enter into Lebanon County industrial history, a name that was to remain most important until the twentieth century.[19] On January 12, 1798, the executors of Curtis Grubb sold all of his real estate to Coleman, including the ore hills, and on May 12, 1798, Henry Bates Grubb, who one week before had acquired the interest of his brother Burd in the three hills, conveyed to Coleman one-half of his interest in the property. Coleman then owned five-sixths of the ore hills, and Henry Bates Grubb retained one-sixth.[20] When Robert Coleman died,

in 1825, he left his interest in the ore hills and all of his other estates, furnaces, forges, farms, etc., to his four sons, William, James, Edward, and Thomas Burd Coleman. [21]

In order to facilitate a proper and convenient division of the Coleman interest in the ore hills, all of the rights of ownership were considered as though divided into ninety-six equal parts. Each of the sons of Robert Coleman received twenty ninety-sixths; and sixteen ninety-sixths went to Edward B. and Clement B. Grubb, the sons of Henry Bates Grubb to whom the original Grubb interest had descended. [22] This division remained, the several ninety-sixths parts being handed down from father to son, until late in the nineteenth century when control of the ore hills began to pass from the Coleman family into the hands of the Pennsylvania Steel Company and later to the Bethlehem Steel Company.

Until the middle of the nineteenth century, the demand for ore was fairly stable. This fact allowed the owners to extract the ore by an unusually simple process, and in much the same way as it had been extracted in the 18th century — each owner taking ore on any of the three hills wherever it was most convenient for him to do so. There was little need for the expenditure of much capital. About all that was required was money to pay the wages of the workers, some picks and shovels, and, later, a supply of powder for blasting.[23] The methods used are roughly to be compared with quarrying.[24] Several men, having only pointed bars, axes, and shovels to use as tools, could easily keep one furnace supplied with ore.

> "The uniform mode of working these hills for a century past has been by superficial diggings in the manner usual in leveling hills or digging gravel from hills or mounds thereof above the surface of the land, when the intent was to remove the whole of the hill, and level the site thereof. There have never been any subterraneous workings for iron-ore, nor any of the expensive contrivances usual in mining; the work has always been prosecuted by daylight, and there have been no cuttings or excavations of greater depth than thirty feet, excepting the cuttings in the breast of the hills from the base or near the base, which have been thus worked into and upon the face of the hill to a greater depth, but never lower than the level of the road, by which the ore when dug is carried away. The motive for making these deeper cuttings rather than continuing the surface diggings has been the greater

> convenience of loading in railway-cars which are brought to the side of the hill. In no case has there been any work done in getting iron-ore in the manner of ordinary mining, but always by such superficial and surface diggings as have been described. And the workings are in another particular varied from that usual in mining, viz: that the whole body of the hill which is dug into, as well as that which lies below the surface as the surface itself, is carried away and used as iron-ore for smelting."[25]

Wagons were used to haul the ore from the hills to the several furnaces in the vicinity using Cornwall ore, though some ore was delivered by wagons to furnaces as far distant as Mt. Vernon Furnace at Conewago, Manada Furnace in Dauphin County, and Reading Furnace at Robesonia.[26] Frequently the wagons and horses were decorated with varied colored ribbons, while some drivers attached bells to the yokes, thus creating a picture and causing sounds which remained a familiar part of the memory of many Lebanon County inhabitants. When the Union Canal was completed, a considerable amount of ore was hauled to the several landings at Lebanon from which it was carried by boats on the Canal to more distant furnaces. On December 11, 1847, for example, eight boats loaded with iron ore left North Lebanon for Reading where were located a number of furnaces using Cornwall ore.[27]

It is not possible to state exactly how many men worked on the hills at any given time during the eighteenth century. The records in existence, such as the Time Books, of the Cornwall Charcoal Furnace, include all of the workmen employed on the Cornwall estates, miners, furnace men, farmers, etc., but do not list them according to occupation. However, it may be said, by way of estimate, that during most of the eighteenth century six to ten miners could supply sufficient ore for the furnaces of the vicinity. During the first half of the nineteenth century that number was likely doubled, as the result of the erection of several additional furnaces that used Cornwall ore. It was in the second half of the nineteenth century that mining operations on an extended scale were undertaken and the number of miners was greatly increased.[28] In 1847 the furnaces at North Lebanon were blown in. In the following decade, as has been noted above, several other furnaces were built in or around Lebanon. These new furnaces created an additional demand for ore which, together with the improvements made in transportation such as the completion of the North Lebanon Railroad in 1855,[29] caused the abandonment of the older methods of mining and the gradual substitution of more

modern methods. In 1865 a spiral railroad was built to the top of "Big Hill", with laterals running to "Middle Hill" and "Grassy Hill". The spiral railroad was designed by William Lorenz of the Lebanon Valley Railroad. It was two and one-half miles long and passed around "Big Hill" two and one-half times in its spiral, reaching an elevation of 250 feet. It was first put into operation in December, 1865.[30] This railroad made it possible for the miners to load the ore directly on to railroad cars instead of hauling the ore by wagon from the hills to the sidings of the North Lebanon Railroad. Instead of digging "mine holes", a system of mining in terraces was adopted, and instead of using bars and picks, rock drills driven by steam power were substituted.[31] Using these methods, operations were begun at the top of the hill; and the terraces, or "benches" as they were called, were cut down by blasting. The "benches" were usually three to four feet in width. In this way, according to the testimony of Mr. J. Taylor Boyd, Superintendent of Mines for R. and G. D. Coleman, in 1851, a miner could take out from five to ten tons of ore per day.[32]

Mention has already been made of the fact that the plantation and the ore hills were located in a heavily forested region. Since charcoal was the only fuel used in the smelting of iron ore until the eighteen-forties, it was most fortunate for the ironmasters at Cornwall in the eighteenth and early nineteenth centuries that this fuel could be obtained from the ample woodlands to be found in the immediate vicinity.

During the winter months, or when the furnace was out of the blast for a considerable time, miners, woodcutters, and all other furnace employees who could be spared would go out into the surrounding forests and cut down the trees.[33] Black oak, white oak, hickory, chestnut or pine were preferred and were cut into logs of proper lengths. These logs would then be stacked until time for charring. It was not feasible to char the wood immediately, for charcoal must be kept under cover or it becomes useless, and the "coal houses", large though they were, could store only enough charcoal to supply the furnace for a short time. A charcoal furnace used about four hundred bushels of charcoal per ton of iron produced.[34]

At Cornwall as many as fourteen men were employed at wood cutting in one season, though the number varied greatly through the years. They were paid by the cord, receiving two shillings six pence per cord in 1768,

twenty-five cents per cord in 1830, and as high as sixty-five cents per cord in 1865.[35] In other instances, men cut wood for the Furnace in return for their rent. In April, 1784, for example an agreement was made with Hugh McLaughlin "to cut 50 Cords Wood and pay all Taxes for One years Rent of the Plantation he lives now on".[36]

The process of "burning charcoal" is seemingly a simple one, yet it required constant care and supervision on the part of the "colliers" lest the hearth break out into open flame and burn the wood to ashes. The "hearth" or "charcoal pit" was a circular plot of ground from twenty-five to thirty feet in diameter. The wood to be charred was brought to the hearth and arranged in the form of a cone, with a central chimney about four inches in diameter and six feet in height, made of logs. The cone was generally from twenty to twenty-five feet in diameter at the base. After the cone was constructed, it was covered with loose soil, leaves, or sod. A fire, started in the chimney, was fed by drafts of air introduced by holes in the side of the pile. For the next several days extreme care was necessary on the part of the colliers to prevent flames from breaking out. If in spite of this care, flames did appear, they would be extinguished immediately with more dirt or leaves from piles previously gathered for that purpose.[37]

When the coaling process was completed, the charcoal was hauled to the charcoal house which was always located near the furnace, and was ready for use when needed. The ruins of many scores of these hearths may still be seen in the Cornwall area, for at such spots the soil today is as black as it was a century or a century and a half ago.

In order to keep the furnace adequately supplied with charcoal the services of several master colliers and some assistants were required. Many of these charcoal burners lived in small log houses in the woods, somewhat removed from the furnace site, thus living a somewhat lonely existence. The locations of several of these cabins are still pointed out by the older residents of the Cornwall region.[38] In the eighteenth century they were paid on a monthly basis, receiving, in 1776, seventy-five to eighty-five shillings per month.[39] In the next century, however, they were generally paid by the cord, being given thirty-three and one-half cents per cord in 1840 and forty to forty-five cents per cord in 1865.[40]

While it has been impossible to estimate with any accuracy the number of men employed in the "mine holes", a study of the Journals, Time Books, etc., does reveal the wages that were paid to these men. For "pounding" in the mine, that is, the breaking up of larger chunks of ore into smaller pieces before loading it, the workman in 1776 received 60 shillings per month.[41] From that time on these men received a steadily increasing wage. In 1820 a "mine pounder" received $12.00 per month.[42] In 1830 he received $25.33 per month,[43] in 1840 it was increased to $27.00 per month,[44] and by 1850 it had reached $30.00 per month.[45] At the end of the period of this study, 1865, mine pounders received $33.60 per month.[46] The wages paid to ordinary laborers, likely of the most unskilled type, did not equal those paid to the pounders. The former received in 1820, for example, $12.00 per month,[47] this wage being increased to $14.50 per month by 1860.[48]

Under the conditions prevailing in the first half of the nineteenth century, these wages proved to be satisfactory to most of the workmen. The Time Books show that year after year, with but few changes, the same men were at work. Labor turnover was at a minimum. In several instances, several generations of the same family, such as the Shays (Sheas) and the Pattons, worked at the mines or the furnaces at the same time. When a workman did become dissatisfied with his wages or his job, he left Cornwall to secure employment elsewhere. But the paternalistic attitude, which the Colemans held toward their employees, helped them usually to have an abundant labor supply.

It was not until 1864 that any real difficulties were encountered between employer and employee. In the first week of April of that year, the "miners" went on strike for a raise in wages to $1.50 per day instead of the $33.60 per month which they had been receiving. When Sheriff Stouch of Lebanon County was notified that the striking miners were rioting, he raised a posse of fifty men to go to Cornwall. When the posse arrived they found no rioting but did bring charges of disturbing the peace against six men who had allegedly taken part in the strike. They were arrested and brought to Lebanon where they gave bail for appearance at Court. At the trial which followed three men, Richard Mullen, Anthony Worley, and Jonathan Witman, were found guilty of conspiracy to commit an illegal act, sentenced to a fine of ten dollars each, plus costs, and were bound in one hundred dollars each to keep the peace for one year.[49]

As the demand for ore increased, there was also a change in the business and legal arrangements which previously had governed mining operations. When demand for ore was limited, as it was during the eighteenth century each of the owners opened "holes" in the "hill" without interfering with each other. With the demand for ore increasing, however, the need for a more business-like arrangement was seen, for each of the owners began to sell as much ore as possible at whatever price he could obtain without making any accounting to the other owners. This resulted in a great deal of confusion and considerable dispute. Consequently on March 30, 1848, the principal owners, Robert Coleman, G. Dawson Coleman, Robert W. Coleman, William Coleman, Edward B. Grubb, and Clement B. Grubb, entered into an agreement by which all of them were to account to one another for all of the ore they removed. This agreement was adhered to for several years, each of the parties to the agreement keeping his own records in an Iron Ore account book.[50] The agreement was soon found to be inadequate. The parties to the agreement discovered that it was impossible to make an equal division of the ore because of the physical features of the ore hills. Some sections of the hills required extensive mining operations, and the ore was found to differ considerably in purity, thus causing a variation in the costs of mining and hence in the price of the ores. This situation gave rise to a ruinous competition among the owners causing disputes which eventually resulted in one of the most famous law-suits in the history of the Lebanon County Courts.[51] It became known locally as "the battle of the giants". The best legal talent then obtainable was secured by all the parties to the suit. The local attorneys retained included John Weidman, Levi Kline, John W. Ulrich, Amos P. Boughter, and Josiah Funck. From the Lancaster County Bar came James L. Reynolds and Clement B. Penrose. Also included in this array of legal minds were Jeremiah S. Black of York, John C. Kunkel and John H. Briggs of Harrisburg, Francis W. Hughes of Pottsville, William Strong of Reading, and from Philadelphia, R. C. McMurtie, George M. Wharton, George W. Biddle, and E. Spencer Miller.

The suit to work out an equitable distribution of the production of the mine was brought in 1851,[52] and after several postponements and appeals, was finally concluded in 1869. But before the Supreme Court of Pennsylvania delivered its final decision, the principals to the suit, or in some instances their heirs, organized the "Cornwall Ore Bank Company" on February 1, 1864.

This company was to control all mining operations and account to the joint owners for all of the ore taken. The accounting was to be done by a General Superintendent of the Mines. J. Taylor Boyd was selected as the first General Superintendent. In order to facilitate the work of the General Superintendent, and to protect the Cornwall Ore Bank Company against domination by any of its individual members, a separate Office Building was erected in 1865. It was "a very handsome building", built of red sand-stone, two stories high, with a tower. The bell which was placed in a cupola on top of the tower was rung to begin and end each working day.[53] The Robesonia Iron Company, however, had not been a party to the suit, nor did it become a part of the Cornwall Ore Bank Company, and so continued to extract ore from the hills under the rights which had been retained by Peter Grubb and which had been transferred to it.

Thus for a period of more than a century and a quarter before the Civil War and only to a lesser extent since 1865, the Cornwall deposits of ore have played a very important role in developing the iron industries of the Lebanon region, and to a certain degree those of the state and nation as well. During the second half of the nineteenth century, fundamental changes in the iron industry took place which somewhat lessened the importance of Cornwall on the national scene, though Cornwall ore continued to be the mainstay for many of the furnaces of central Pennsylvania. The increased building of railroads which decreased the costs of transportation; the discovery that coke made from bituminous coal could be used advantageously as fuel in the smelting of iron; and the discovery in the Lake Superior district of ores that have the double advantage of containing less sulphur and being strategically located for cheap water transportation to the coke centers[54]—all these served to take the center of the iron industry from eastern Pennsylvania to the region west of the Appalachians.

It was only natural that, since the amount of ore which was mined at Cornwall was very large, and since the mining operations there proved to be very profitable, men would assume that other lands in Lebanon County contained deposits of iron ore which would be equally profitable. Hence the search for ore and the announcements of claims of having discovered beds of ore were items of increasing interest to the people of the county in the decades before the Civil War.

It is true that much of the soil of the county does contain traces of iron. And, indeed, here and there, scattered throughout the Lebanon Valley, there are "beds" of iron ore. Even today, two centuries after the first settlers arrived, one occasionally learns that a farmer has "discovered" a deposit of iron ore on his land. Officials of the Bethlehem Steel Company still receive "offers" of fields which have, according to the owners, "large deposits" of ore. When these claims are examined, however, it is always found that the "deposit" is so small, or the iron content of the ore is so low, that the expense of extraction and transportation would not warrant any operations of any kind being undertaken. But the owner of the land seldom accepts such economic reasoning as final. He usually retains for a long times his delusion that great potential wealth lies unexploited in his fields.

Some of these deposits, especially some of those found in the nineteenth century were, though small in area, quite rich in content. Most of them were close to the surface of the land on which they were located, permitting direct loading of the ore on to wagons to be hauled to the nearest furnace. Such beds were worked until they were exhausted; all that remains of such efforts today are abandoned holes around which farmers must detour laboriously every time they plow their fields. While a few of these beds were worked for a period of several years, most of them were operated only a few weeks or months. None of them, as far as can be learned today, were very successful financially, and, after a time, it became an accepted fact that Cornwall was the only place in the county where large deposits of iron ore are to be found.

The most active search for these scattered deposits coincided, quite naturally, with the period of expansion of the iron industry in the 1840's and 1850's. In those two decades claims were made for the discovery of iron ore in eight townships of the county. This caused for a brief period some speculation in farm lands which were thought to contain iron ore deposits. As a result farm prices were for a time very much higher than normal.

Many of these claims can be found in the newspaper advertisements of the period. Instead of emphasizing such qualities of the farm as fertility of soil and fine woodlands, the owner stresses the fact that his land contains iron ore deposits. In 1845, for example, the properties of Valentine Shouffler of Jonestown were advertised for sale. These properties included a tract

of land in Swatara Township which contained, it was stated, "an inexhaustible body of iron ore which will some day be a source of great speculation".[55] In 1847, a farm situated near Annville containing less than one hundred acres was sold for ten thousand dollars. The high price obtained in this sale was due to the fact that the farm included an iron deposit of unstated size.[56]

While most of the sites of these iron deposits were in the southern end of the county, along the South Mountains, occasional references to ore deposits along the Blue Mountains to the north can be found. In 1849 one such location was noted. In this reference the additional advantage was stressed that it was near a large body of anthracite coal. "The gentleman who informs us, says that the specimens he picked up are of the purest ore, and the appearance thereabouts presents every promise of a valuable bed."[57]

There were a few of these small enterprises however that were successfully operated for a brief time. In these cases the deposits of ore were large enough to attract men of capital and thus assure the machinery and equipment necessary to carry on operations. One of these "mines" was located at Newmanstown. "Iron Ore, promising fair for an extensive and valuable bed, has been discovered on a tract of land near Newmanstown . . . which has been purchased by Messrs. Kline and Krause of this Borough. [Lebanon] Should this bed come up to anticipations of the gentlemen purchasing, we believe it is their intention to commence the erection of a Furnace, early in the Spring, on the Canal, nearly opposite this place. Such enterprises must meet the good wishes of our citizens, as it is by the Iron and Coal business that Lebanon is destined to flourish."[58] This ore bank was successfully operated for a time by a company of men from Lebanon: Kline, Guilford, and Shirk.[59] The anticipated furnace was never built, though these three men later joined with several others in erecting the Dudley Furnace near Lebanon in 1854.

Another of these small deposits which was worked sporadically was known as "Bowman's Mine", and was located in Cornwall Township. It was situated on a tract of twenty-four acres of land and in the fifties was owned and operated by Simeon Guilford.[60] In the latter part of the decade operations were suspended. In 1863, however, the firm of McManus, Seifert and Co. of Reading purchased the land for $4,500, and once again these "ore holes"

were put into operation.[61] Several times during the rest of the nineteenth century and in the twentieth century other individuals and companies have attempted to work these mines, but never with any great success.

All told, there were seven iron ore mines being operated in 1870. It is a rather interesting commentary on the progress which steam power has made in the country, to note that all of these mines, large and small, used steam engines to assist in the work of mining. The use of water power in mining operations had been totally abandoned, though it is still used here and there as power for feed and flour mills. These seven mines employed no less than 176 employees, most of them doubtless working at the Cornwall mines. The use of shafts and tunnels had not yet been adopted at any of these mines because all of these employees are listed as being used "above ground". In 1870 these mines produced 170,830 tons of ore, valued at $460,406.[62]

NOTES

1. Bining, A. C., *Pennsylvania Iron Manufacture in the Eighteenth Century*, 11.
2. *Ibid.*, Chapter III.
3. In 1870, for example there were 733 men and boys employed in the various iron industries of Lebanon County; there were eighteen establishments capitalized at $1,572,000. The cash wages paid to these employees for the year amounted to $340,679 and the materials which were produced were valued at $2,018,820. *Ninth Census*, (1870), III, 726.
4. Cornwall Furnace, Blast and Pig Iron, 1776-1792; 1825-1832. It is likely, however, that some iron from Cornwall was shipped to England by way of the Susquehanna River and Baltimore. See Acrelius, *op. cit.*, 165.
5. See Chapter VII.
6. Cornwall Furnace, Journal, 1848-1868.
7. Raymond, R. W., The American Iron Master's Work, *Atlantic Monthly*, XL, 527, this includes Cornwall as one of the "very brilliant exceptions" to the general statement that "The ore mines in the United States are not, on the whole, conveniently located with respect to fuels used in turning the ore into pig iron".
8. *The Press*, August 5, 1857; the editor of the *Lebanon Courier* several months later commented on the ore hills with characteristic local pride thusly, "Cornwall is a natural and national curiosity, which we of Lebanon have just cause to be proud of". *Lebanon Courier*, January 15, 1858.
9. The name Cornwall doubtless was chosen by Peter Grubb to honor the original home of the Grubb family in England.
10. Life and Letters of Edward Burd Grubb, I, *passim*, gives an adequate genealogy of the Grubb family.

11. Acrelius, *op. cit.*, 164.
12. *Pennsylvania Magazine of History and Biography*, I, 116.
13. Letter of "J.F." to the *Norristown Herald*, Lebanon, July 29, 1847, reprinted in the *Lebanon Courier*, August 14, 1847. "We learned", wrote the editor of the *Courier* on September 30, 1853, "that Mr. Worrell, a competent engineer, has made a measurement of the mines, from which he estimated them to contain *forty millions of tons of ore* above water level". Not everyone connected with Cornwall was so optimistic, however, as to the amount of ore remaining in the "Hills". Sam Small, an agent for the Grubbs, on June 24, 1867, wrote to Edward Grubb, "I was at Cornwall last week, and I was surprised how the Ore has gone, daily growing less. We ought to do something to stop this immense reduction of the Bank. . . . It appears to me we should advance the price and allow only a given quantity to be sold". Life and Letters of Edward Burd Grubb, II, 86.
14. *Summary Final Report on the Geology of Pennsylvania* (1892); For description of the Cornwall ores, see Spencer, Arthur C., *Magnetic Deposits of the Cornwall Type*, U.S. Geol. Survey. Bulletin 359. Washington, 1908; *The Annual Report* of the 2nd Pennsylvania Geological Survey for 1885.
15. Grittinger, Henry C., Cornwall Furnaces and the Cornwall Ore Banks or Mine Hills, in Lebanon County Historical Society *Papers*, II, 54. Mr. A. Wilhelm, manager of the Cornwall Anthracite Furnace, testified in 1851, in the case of Coleman v. Coleman, that it "takes 2 tons, 1 cwt. to make one ton of iron, on the average for the year". *Record of Court of Common Pleas of Lebanon County of August Term, 1851, No. 23.* Coleman v. Coleman. This volume will be cited hereafter as *Record of Court.* See also *Alden's Appeal Record.*
16. Swank, James M., *Progressive Pennsylvania*, 219. Still another estimate was made in *Iron Age*, July 26, 1901, of 16,353,448 tons. With reference to these statistics as cited by Swank, however, he adds, "the word production is strictly applicable only down to 1853, but for that year and for all subsequent years the figures represent shipments only. For all practical purposes, however, production and shipments may be regarded as convertible terms, as in a series of years production and shipments would be equalized".
17. Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 34-39; see also a chart prepared for this Society by Mr. Paul Grittinger which traces the ownership of the Cornwall Ore Banks from 1734 to 1932. For a shorter account of the Chain of Title, see Egle, W. H., *History of the Counties of Dauphin and Lebanon*, etc., 167, Bining, A. C., *Pennsylvania Iron Manufacture in the Eighteenth Century*, 57; also "Complainant's Bill". Copy of "Bill in Equity. Filed June 7, 1851", in *Record of Court*, pp. 7-15; *In the Supreme Court for the Middle District of Pennsylvania.* Coleman v. Coleman. Appeal of R. and G. D. Coleman. Counter Statement of E. Burd Grubb, Administrator of Edward B. Grubb, in *ibid.*, 1-6. For a condensed form of the chain of title, see Swank, *op. cit.*, 216-217.
18. *Alden's Appeal Record*, Reported 93 Pennsylvania 189; Coleman v. Coleman 12 Penna. 253-255; Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 36. This right was later sold to George Ege, and later passed into the hands of the Robesonia Iron Company.

19. Swank says of Robert Coleman, "For more than a quarter of a century he was the most prominent ironmaster in the State". Swank, James M., *Introduction to a History of Iron Making and Coal Mining in Pennsylvania*, 27; a brief sketch of the life of Robert Coleman, including his services during the Revolutionary War, and his subsequent political activities is to be found in *Pennsylvania Magazine of History and Biography*, XXXVI, 226-230, and XI, 71. Ten years earlier, in 1776, Coleman leased Elizabeth Furnace for a period of seven years. He was thus in an excellent position to know the potentialities at Cornwall.
20. Coleman v. Coleman, 12 Pennsylvania 253-255.
21. The Will of Robert Coleman. Lancaster County. Register of Wills. Will Book "O", Volume I, pp. 347-351.
22. Coleman v. Coleman, 12 Pennsylvania 253-255.
23. Robert Coleman v. Robert W. Coleman, No. 37, May Term, 1869. George D. Coleman v. Robert W. Coleman, No. 38, May Term, 1869. In the Supreme Court of Pennsylvania, Middle District, 1869, pp. 14-16; see also Coleman v. Coleman 12 Pennsylvania 253-255.
24. "Their manner of working is, and has been, to run over the surface, where the mining or quarrying was easiest — hence there are openings . . . *all around* and *all over* these mounds, from their bases to their top: each only tending to show that, the further you go down or into the hill, the more solid the ore becomes." Letter of "J.F." to the *Norristown Herald*, July 29, 1847, in *Lebanon Courier*, August 14, 1847.
25. Coleman's Appeal, 12 Pennsylvania, 259-260.
26. Schoepf, John D., in his Travels Through Berks County in 1783, *Pennsylvania Magazine of History and Biography*, V, 80, states that iron ore from Schaefferstown and "Grubb's mine" was sent to John Patton's furnace, ten miles above Reading.
27. *Lebanon Courier*, December 18, 1847.
    The firm of Shirk, Light and Hoffman, in North Lebanon handled most of the ore from Cornwall in the 1840's. Teams carried the ore from Cornwall to North Lebanon, and from there it was forwarded by way of the Canal to the various forges and furnaces which were located near the Canal in Lebanon and nearby counties. See for example, Cornwall Furnace, Blast and Pig Iron Book, 1832-1846, *passim*.
28. The editor of the *Lebanon Advertiser* stated in the issue of April 21, 1852, that 60 men were then employed at the Cornwall Ore Banks. Whether or not all of these men were "miners", he does not say.
29. *Lebanon Courier, Lebanon Advertiser, passim*, 1850-1857, *House Executive Documents*, 116, 37:2. *Preliminary Report, Eighth Census*, (1860).
    The North Lebanon Railroad was an enterprise entirely conceived and executed by the Colemans, the owners of the Cornwall Ore Hills, especially R. W. Coleman, William Coleman, G. Dawson Coleman, and Robert Coleman.
    In 1850 bills were introduced simultaneously into the Senate and House of the Pennsylvania Legislature for a charter to build a railroad which would connect the ore hills with the Union Canal landings at Lebanon. The agitation at that time for a railroad from Harrisburg to Reading, was an added incentive to the building of this road. In April, 1850, the bill was passed and signed, and books for subscrip-

tions to stock were immediately opened. All of the stock was at once taken by the Coleman interests. On June 29, 1852, the stockholders met to organize and elected Robert W. Coleman as President of the road.

Construction of the road was begun in March, 1853, and was rapidly pushed to completion. In October, 1855, trains bearing ore began to roll from Cornwall to Lebanon. A trainload or two now brought in as much ore as 100 teams of horses pulling four ton wagons delivered to the Canal previously. By 1857, well over 600 tons of ore were brought from Cornwall to Lebanon daily.

The road when completed cost $309,195, and was 8.2 miles in length.

30. *Lebanon Courier*, October 26, 1865; December 7, 1865.
31. *Record of Court*. Coleman v. Coleman. Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 39-42.
32. *Record of Court*. Coleman v. Coleman.
33. *Alden's Appeal Record*, 93 Pennsylvania 191.
34. Bining, *op. cit.*, 75; Lebanon County Historical Society *Papers*, II, 21.
35. Cornwall Furnace, Journal, 1767-1768; 1822-1833; 1848-1868.
36. Cornwall Furnace, Time Book, 1776-1785.
37. Bining, *op. cit.*, 73-76.
38. "Governor Dick", a hill a short distance east of Mt. Gretna, derived its name, according to an accepted local tradition, from the fact that a slave of that name was a collier whose cabin was located at the foot of the hill. Today Governor Dick is a favorite spot for picnickers, and hikers.
39. Cornwall Furnace, Journal, 1774-1776.
40. *Ibid.*, 1832-1841; 1848-1868. In 1865, however, some of the colliers were paid $1.70 per day.
41. Cornwall Furnace, Journal, 1774-1776.
42. *Ibid.*, 1804-1822.
43. *Ibid.*, 1822-1833.
44. *Ibid.*, 1832-1841.
45. *Ibid.*, 1848-1868.
46. *Ibid.*, 1848-1868.
47. *Ibid.*, 1804-1822.
48. *Ibid.*, 1848-1868.
49. *Lebanon Courier*, April 14, 1864; April 21, 1864; April 28, 1864.
50. *Record of Court*. "Statements of R. W. Coleman and Robert W. Coleman, of the iron and copper ore used and sold by them, presented to the Master." "Statements of R. & G. D. Coleman, of iron and copper ore used and sold, presented." "Statements of Edward B. Grubb and Clement B. Grubb, of iron and copper ore used and sold, presented." "Statements of iron ore used and sold by the owners of Reading Furnace, presented by the Messrs. Grubbs." See also *Iron Ore* account book of R. W. and William Coleman, November 1, 1860, to December 31, 1861.
51. *Record of Court. Robert W. Coleman* v. *William Coleman, Robert Coleman, G. Dawson Coleman, Edward B. Grubb, and Clement B. Grubb.* See also Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 53.

52. *Lebanon Courier*, December 26, 1851; February 20, 1852; *Lebanon Advertiser*, February 25, 1852; April 28, 1852.

53. *Lebanon Courier*, December 7, 1865. The minutes of the meetings of this company from 1864 to 1882 have been published in the *Articles of Association of the Cornwall Ore Bank Company, With Full Minutes.*

54. The subject of the shift westward of the iron industry after the Civil War is generally covered in Kirkland, E. C., *A History of American Economic Life*, Ch. XI; Shannon, F. A., *America's Economic Growth*, Ch. XXIV; and Clark, V. S., *History of Manufactures in the United States*, I, 496-501. See also Swank, *Progressive Pennsylvania*, 219-221, especially the table on p. 221.

55. *Lebanon Courier*, September 17, 1845. In one of his many editorials on the subject of the bright future for Lebanon County industry, Mr. Worth of the *Courier* wrote, "The Ore of Lebanon County is inferior to none in the country; and we hear that there is a prospect of an addition of several new beds to those already opened. Capitalists, who wish profitable and safe investments, should turn their attention this way". *Ibid.*, January 15, 1848.

56. *Ibid.*, January 1, 1848. In 1849 another advertisement noted that "over Two Hundred tons [of iron ore] have been taken out" of the deposit to be found on the farm. *Ibid.*, September 8, 1849.

57. *Ibid.*, June 23, 1849. See also the claims advanced for a tract of land located near Bunker Hill on the farm of Dr. Cooper, in *ibid.*, June 6, 1851.

58. *Ibid.*, December 4, 1847.

59. *Ibid.*, July 22, 1848. Mr. Simeon Guilford, one of the members of this company, was a Civil Engineer who had been very active in the construction of the Union Canal in the 1820's. He later turned his attention to the iron industry and became part owner in several enterprises in and about Lebanon. Lebanon County Historical Society *Papers*, III, 18-19.

60. Assessments of Cornwall Township, 1854. See also Egle, *op. cit.*, 161.

61. *Lebanon Courier*, December 24, 1863. In Jackson Township, two and one-half miles south of Myerstown, a mine was worked for several years during the Civil War, but it too was short-lived. *Ibid.*, August 25, 1864.

62. *Ninth Census*, (1870), III, 786.

CHAPTER V

CORNWALL—
PLANTATION AND FURNACE

The development of the iron manufacturing industries in Lebanon County up to the time of the Civil War, as has been noted above, is divided into two clearly defined periods: 1737 to 1840 and 1848 to 1857. The earlier period witnessed the erection of one bloomery erected by Peter Grubb about 1735; three cold-blast charcoal furnaces, Cornwall, 1742, Colebrook, 1791, and Monroe, 1837; six forges, Upper and Lower Hopewell, 1737-1742, Newmarket, 1748, Speedwell, 1760, Union, 1782, and Monroe, 1835; and one foundry, Phraeners, in Lebanon, 1840. Although all of them played a part in developing this very essential industry, it was the Cornwall Charcoal Furnace, the third of these to be established in point of time, that played the most important role for many years, and had the longest career. Then, too, its history has been romanticized to such an extent that the mere mention of Lebanon County even today immediately calls to mind "Cornwall Charcoal Furnace".

For many years a tradition persisted that the first actual "iron works" in Lebanon County was a bloomery, erected by Peter Grubb about 1735. Its location was said to have been about one-half mile south of the present site of Minersvillage, near the ore hills. In 1899, Mr. J. Taylor Boyd, Superintendent of the Cornwall Ore Bank Company, and Mr. Henry C. Grittinger, after a careful search, discovered some cinder and white iron, lightly covered with top soil, in the location generally pointed out by the older residents of the region as the location of the bloomery. There was evidence also that a stream of water, long since dried up, had passed nearby. These evidences seemed to the gentlemen named above to prove the tradition. The bloomery must have been a small one, perhaps erected on an experimental basis, to determine how well the ores of Cornwall could be worked. The absence of any records of its operations, the small size of the stream of water used to provide power, the narrowness of the ravine, and the lack of evidence that any substantial buildings were erected on the site would seem to show that it was not intended as a permanent iron works.[1]

In 1739, with doubtless the experiences of operating this bloomery to guide him, Peter Grubb definitely set out upon a career as ironmaster. He thereupon began the industry which for the succeeding two centuries was to be the economic foundation of industrial Lebanon County.

> "On the 22nd day of September in the thirteenth Year of the reign of King George the Second over Great Britain, France &c, Anno Domini 1739, between Peter Grubb of the township of Warwick in the County of Lancaster, of the Province of Pennsylvania, Iron Master, with Samuel Grubb of East Bradford, in the County of Chester, a Charcoal Furnaee to be built, & to be called Cornwall . . . ."[2]

It is this furnace, the Cornwall Charcoal Furnace, that for fifty years had a monopoly on the smelting of iron ore in the Lebanon area. Since it was for many years the center of the economic life of the Grubbs and, later, the Colemans, and since the estates of the latter family for so many years were located near the Furnace, it may be well at this point to give a brief description of the plantation upon which this Furnace stood.

Beginning with the small tract which Peter Grubb purchased in 1734, the Cornwall plantation grew steadily in size through additional purchases by the Grubbs and, later, the Colemans By the middle of the nineteenth century, the tract of land upon which stood the Cornwall Furnace consisted of 9,669 acres.[3]

On this tract, at one time or another, were located the Cornwall Ore Hills, three furnaces, Cornwall Charcoal, Colebrook (Mt. Joy), and, after 1849, the Cornwall Anthracite; two forges, Hopewell and Speedwell, several large mansions, mills, schools, stores, and villages in which lived many of the workmen who were employed by the owners of the above enterprises. There were also farms and woodlands to be included in this general sketch. In fact, with some few rather obvious exceptions, such as salt and sugar, most of the necessities of life were produced on the plantation. Economically, it was almost self-sufficient. The farms supplied the food needed by the owners and workers, the woodlands supplied the fuel needed by the furnaces and forges.

Many of the buildings were built of brown sand-stone, found so plentifully in the region about Cornwall. Many of them are still standing, now

occupied, in several instances, by the descendants of the owners and workers of the eighteenth century. Houses for the workers were generally erected along the roads which crossed the plantation, near the furnace or forge at which the men worked. A few of these villages received their name from the name of the furnace, others received such quaint appellations as "Miners-village", "Goosetown", and "Dutchtown". The houses in these villages were rented on an annual basis to the workers. Rents varied in amounts from £5 to £7.10 in 1796,[4] to $20.00 to $30.00 per year in 1840.[5] They were quite small, usually consisting of two rooms on the ground floor with a loft above, or in the larger houses, with two rooms on the second floor. Since much of the wages of the workers was spent for the bare necessities of life, few if any fine furnishings would be found in their homes.

Perhaps the best known of the houses occupied by the owners of Cornwall was the "Cornwall Mansion", located a short distance to the northwest of the Furnace. The original mansion was erected by Curtis Grubb in 1773 or 1774 and later passed into the hands of Robert Coleman in 1798. Since that time it has been constantly the home of various members of the Coleman family. It has been enlarged several times and was occupied for many years prior to her death in 1946 by Mrs. B. H. Buckingham, the great-granddaughter of Robert Coleman. The grounds and gardens which surround this house constitute an historical estate. Beautiful sunken gardens surrounded by box-woods overlook the large meadow which was used as a proving ground for the cannon made at the Furnace during the Revolutionary War. These grounds give every evidence that they have always had the best of attention. As early as 1783, one "Joseph Hudson had agreed to be Bankman during the Blast for which he is to have 40 shillings per mo. exclusive of his monthly Pay as Gardener both Places he is to perform with care and assiduity".[6] By 1789, the need for a permanent "Gardener" was seen and William Ewing was employed in that capacity, receiving 45 shillings per month in wages.[7]

Here and there on the estate are to be found huge trees, at least one of which is said to be over two hundred and fifty years old. This tree is now marked with the following inscription: "1632-1932. This tree was living when William Penn came to Pennsylvania, 1682. White ash-Fraxinus Americana, girth, breast high, 1932, 16 ft. 2 in".

In 1847, "J.F." of Norristown visited Cornwall Mansion. In a letter written to the *Norristown Herald,* he said, "We left Lebanon at 9 o'clock and rode over to Cornwall Furnace, a distance of about five miles, in a southerly direction. Stopping at the Mansion we were welcomed and entertained in the old fashioned gentlemanly style of true hospitality . . . . To look through the Mansion with its garden, arbors, fish ponds, and summer houses, is calculated to create in the minds of those aspiring to splendor, a feeling of discontent with their lot".[8]

While the center of interest on the Cornwall plantation was the Furnace, and the smelting of iron ore, considerable attention was given also to agriculture. Grains, such as wheat, oats, corn, rye, and barley were raised, as were potatoes and flax.[9] The cattle on the plantation supplied food for the workers and owners and leather for shoes, aprons and harness.

To complete the picture of the plantation, the grist mill should be mentioned. The mill was located about one-half mile to the west of the Furnace on Furnace Creek from which it derived its power. The first mill was built about 1780 and in addition to its more customary use, was frequently used by itinerant preachers as a meeting-house. By 1800, the work of the mill required the services of a regular "miller", who in that year was given £48.9.6 for his services.[10] By 1820, his salary had been increased to £75 per year.[11] In 1855 the services of an "assistant miller" were required due to the increase in custom. He received $17.00 per month in 1855 while the salary of the "miller" was increased to $250.00 per year at the same time.[12]

The people living in this compact community were an interesting lot. There were, in addition to the owners, at first, the Grubbs and later the Colemans, a very heterogenous group of workers. On the list of workmen in the Time Books of the Furnace are to be found names of men of English, Irish, and German descent, as well as an occasional Frenchman. Many of these workers were freemen, but there were also slaves, and indentured servants. During the American Revolution, when labor was scarce, Cornwall Furnace was permitted to employ Hessian prisoners.[13] Many of the latter at the conclusion of the Revolution decided to settle permanently in the Cornwall region, and from them are descended many present day inhabitants.

Men, however, were not permitted to monopolize all of the activities on this plantation. Women, too, proved to be very helpful in carrying on the necessary work. While there are no records extant to show that women helped in the making of iron, many of the women did work in the fields, in addition to performing their duties in the home. In 1781, for example, Daniel Bryans and his wife received eight shillings for two day's work at "pulling flax"; while Peter Rice and his wife received nineteen shillings for "heckling 31 lb. flax and spinning 18 lb. tow and 4 lb. Candle Week".[14] Again, in 1834, the Time Books show that of the forty persons listed as "mowers" and "haymakers", ten were women.[15] Also, in 1838, eight women were listed as "haymakers" for which they received twenty-five cents per day.[16] Other women were employed regularly to cook for the men working at the Furnace for whom "diet" was provided.[17]

Opportunities for recreation and amusement were few, of course, throughout the eighteenth century, and but little better in the nineteenth century. But in spite of the distance to Lebanon and to Lancaster, the nearest towns, and despite the limited amount of leisure time at their disposal, owners and workers alike occasionally availed themselves of opportunities to enjoy themselves. For the owners and managers there were dances and parties to attend, and horse races and fox hunts in which to participate. The pleasures of the workers were apt to be more simple. Especially in the early years of the nineteenth century, the Journals and Time Books record days missed from work because the men were off to the "Battalion" or went to the "Fair" or to "Campmeeting".[18] Unfortunately, on some occasions, the men were not satisfied with these simple pleasures. Drunkenness, though not excessive at Cornwall, was fairly prevalent. On occasion a worker might lose as high as six days work in one month because of his having imbibed too freely. On other days he would receive only half-time because of his inability to rise and go to work with the other workers.[19] However, it is easily possible to over-emphasize the frequency of drunkenness among iron workers. The amount of liquor consumed was relatively high, but there were many workers who in spite of their heavy drinking seldom lost a day's work. John McFall, in May, 1766, purchased five quarts of whiskey from the Furnace Store, yet was not among those listed as having lost work because of drunkenness.[20] While most of the workers did imbibe occasionally, many of them averaged about one quart per week throughout the year. Whiskey seems to have been

the favored drink, for it alone is listed as a separate item in the Journals. But the workers also enjoyed rum, gin, beer, and wine, when those beverages could be obtained in the nearby towns.

In spite of these diversions of one sort or another, the life of the iron worker was not an easy one. It was a life characterized mainly by hard work. The wages received by the workers were not high enough ordinarily to permit accumulation of the necessary capital to become an ironmaster. It is true that occasionally clerks or managers of furnaces did become ironmasters, as for example, Robert Coleman. But in the Lebanon area, the expansion of the iron industry down to the time of the Civil War lay almost exclusively in the hands of the descendants of Coleman. The average iron worker could look forward only to a life of hard, unceasing labor, with only a relatively few breaks in the monotony of work.

As has been noted elsewhere, the workers at Cornwall were of several nationalities and included freemen, indentured servants and slaves. According to the records of the Furnace, not many indentured servants were used at Cornwall. These servants, or redemptioners (the terms were frequently used interchangeably) were, for the most part, unskilled workers. They came largely from Germany and Great Britain. Not having a sufficient amount of money to pay for their passage across the Atlantic, they were bound to a master for a stated number of years. Because of their tendency to run away at the earliest opportunity, especially when bound to a master who lived near the frontier, these servants were often a nuisance to the master. Especially would it work a hardship on an ironmaster. When the blast was underway at the furnace, all hands were needed until the furnace was blown out. It was, perhaps, because of their general unreliability that they were not used in greater numbers at Cornwall. The amount of money necessary to purchase an indentured servant was not great, although for the colony of Pennsylvania at large, amounts varied. On February 26, 1776, Cornwall Furnace was charged £15 "for a Servant Man nam'd Jno. McDonald, payable 1st May, as per Note of Hand".[21] This servant was purchased from Robert Connelly of Philadelphia County. In October, 1784, "Six Irish Servants began to work ye 14th".[22] After this date there are no further indications that indentured servants were employed at Cornwall Furnace.

Despite the many restrictions which were placed upon the importation of negroes into Pennsylvania during the eighteenth century, the institution

of slavery was widespread in the colony. It has been estimated that, at the time of the American Revolution, there were about six thousand slaves in the State.[23] As has been noted previously, Pennsylvania became in February, 1780, the first state to provide for the abolition of slavery. Prior to that time negro slaves were a common sight at the iron furnaces of Pennsylvania. Most of the negroes, free and slave, were used as common laborers, though occasionally they became skilled at charcoal burning or iron making.

Negro slaves were used at Cornwall Furnace at a very early date. In April, 1766, eleven negroes were listed in the Journal as belonging to Peter Grubb. In 1780 the act for gradual abolition also provided for the registration of all slaves then in the State. In that year there were thirteen slaves at Cornwall.[24] They constituted about one-third of the total number of Furnace employees at that time, for there were twenty-four additional employees listed in the Time Book for that year.[25]

The prices paid by the Grubbs for their slaves varied considerably. In 1766, a negro boy was bought for £65; in 1772 a negro woman and her child cost £50. Two slaves, Bob and Cato, were purchased in 1776 for £240. In the period of inflation during the Revolution, two negro slaves cost £825. The last slave purchased at Cornwall, Richard by name, cost £110.[26]

The number of negroes employed at Cornwall gradually declined after 1780. As the older slaves died or became too old to work, their places were filled by free white laborers. Several of the negroes were retained for domestic service, but when they died their places also were filled by white servants. At the end of the year 1792 only one negro was listed as working at Cornwall.[27]

In addition to the free workers, indentured servants, and slaves as mentioned above, Cornwall Furnace also employed Hessian prisoners for several months in 1777. On July 8, 1776, the Council of Safety of Pennsylvania passed the following resolution: "That the Iron Masters employed in Casting Canon or shot for the publick service, in the Counties of Chester, Lanc'r and Berks, be permitted to employ any of the soldiers, Prisoners of War, at Lancaster and Reading, as Labourers in the said Business, giving an Account to the Committees of Lancaster and Reading of the times of such soldiers as they shall so employ".[28]

Despite a resolution of the Council of Safety, July 31, 1776, "That all necessary workmen at Iron Works shall not leave their jobs nor march with militia unless by special convention of the Council",[29] some of the workmen left Cornwall Furnace to join the Revolutionary forces. Their departure plus an ever insistent demand for more cannon and shot created a scarcity of labor for Curtis Grubb at the Furnace. So, acting on the Council's resolution of July 8, 1776, Grubb requested the services of some Hessian prisoners. On or about April 23, 1777, twenty-two prisoners arrived at Cornwall under the command of a "serjeant".[30] They lived in "barracks" which had been made for them by one John Peters.[31] The Hessians were put to work cutting wood and doing other odd jobs around the Furnace.[32] For this work, the Council received from eight shillings per week to forty-five shillings per month for each Hessian. On July 7, 1777, the Journal records "The Hessian Prisoners, 85 weeks 3 dys Work. 22 Hands @ 8/ per Week, £34.4.0. 6 mo. 24½ dys ditto, 4 Hands @ 45/ per mo., £15.12.5". This totalled a credit of £49.16.5. Apparently most of the Hessians were then removed, for only a few of them appear in the Time Books after that date. Those who remained were employed as wood cutters.[33]

The number of workmen required at the Furnace cannot be stated exactly, although at no time was the number employed very large. When the Furnace was in blast, it required constant attention, so that the men worked in two twelve-hour shifts. For each shift it was essential that there were available one founder, one keeper, one gutterman, several fillers, and several laborers.

Likely the most skilled worker employed at the furnace was the "founder". It was his duty to regulate properly the "charge" of the furnace, that is, the proper amounts of ore, charcoal, and limestone. His decision as to the amounts of each to put into the furnace was based on his experience and on intuition. Experience of course assisted him in determining the proper amounts of each ingredient, but he also had to "know" his furnace. The founder also made the sand molds and cast the iron into the items ordered by the customers of the furnace.

The other furnace employees were generally semi-skilled or unskilled workers. The "keeper" kept the furnace in operation under the supervision of the founder. The "gutterman" was in charge of the sand molds. The

"filler" kept the stack continuously filled with alternate layers of charcoal, limestone, and iron ore. Other laborers employed at the furnace did such work as hauling ore and limestone to the furnace and slag away from the furnace to the "slag dump", repaired roads, and performed such other tasks as might be required. When the furnace was out of blast, however, everyone was put to work relining the stack, renewing the sand beds, repairing the race and preparing for the next blast.[34]

The earliest records at Cornwall indicate that, in addition to the workmen noted above, the Furnace always had a manager and a clerk. The manager usually was a son of the owner, although from the latter part of the eighteenth century, when the Coleman interests in the iron industry became very extensive, other men were employed as managers. The manager had general supervision over the operation of the Furnace and farms. The clerk had charge of the bookkeeping and timekeeping.

The owners of Cornwall Furnace in its long history offer a fine example of the "family dynasty" in industry. Most of them, and particularly is this true of the Coleman family, remained close to the iron industry of Lebanon County until well into the twentieth century. Always to be found among the leaders of society as well as of industry, they also showed on many occasions a strong interest in the affairs of the nation. In connection with the history of the Cornwall Furnace, it is of some interest to note the contributions made by the Grubbs to the cause of freedom in the Revolution.

The ironmasters of Pennsylvania, with but few exceptions, were very influential in the American Revolution. Many of them took an active part in the fighting by organizing companies of men and leading them into battle, while others expended every effort to keep the army supplied with cannon and shot. "The leadership and aggressiveness of the owners of the iron works, together with their services, must be taken into account in a consideration of the struggle for independence."[35]

The owners of Cornwall Furnace during the Revolution were among the early supporters of the cause. The Furnace cast cannon and shot for the American Navy, and stoves for the army; the Cornwall farms were used to pasture horses of the army.[36] Both Curtis and Peter Grubb became Colonels in the army.[37] As early as April, 1776, Curtis Grubb organized his "company of militia", and was off to camp.[38]

The Grubbs were also busy at the Furnace in addition to their military activities. Every effort was made to supply the Congress with cannon and shot which was to be used by the United States Navy. It is true that the Navy in the early years of the Revolution was an improvised one, consisting mainly of converted fishing schooners. But the glories of the exploits of our naval actions against the mother country will never die. Because Cornwall Furnace supplied many of the cannon used by the Navy in the early period of the war, reference may be made to the contributions of the Furnace to the success of the American Revolution.

As early as April 12, 1776, Curtis Grubb wrote to his brother Peter from Philadelphia that "This day I am Going to Contract for 100 Ton of Canon. Dont Lett the Furnace be put in Blast till I come up, which will be A Monday Night I Expect: Hurry them on As fast as possible to Get Ready".[39]

On the 19th of April, 1776, Mr. Morgan Busteed arrived at Cornwall Furnace and had several expert workmen with him.[40] Busteed was an experienced "cannon founder". He also owned some gun molds which he brought to Cornwall thus saving the Grubbs the time and money necessary to make their own.[41] Busteed and his men set to work immediately to put a new hearth into the Furnace. Considerable difficulty was experienced in setting up the equipment necessary in the casting and boring of cannon. It was not until July 6, 1776, that the first cannon, twelve-pounders, were cast, and they were not fit for use.[42] When the necessary repairs and adjustments were made to the boring machine, another attempt at casting cannon was made in August. This time the effort was successful. On Sunday, August 25, "Mr. Busteed proved a 12 pounder with 12 lb. powder and one Ball, rammed with Hay".[43] After this first successful proving, the casting of cannon proceeded rapidly. Not all of the cannon cast, however, were successfully proved. Several of them burst when the first shot was fired from them and others were spoiled in the casting process. Then, too, many of the cannon were too heavy and thus could not be used.[44] One of the cannon which failed to prove satisfactory has been kept on display on the "mansion" grounds as a relic of the Revolutionary War and Cornwall's part in it.

On October 26, 1776, however, the first cannon from Cornwall Furnace was hauled to Philadelphia by John Smith, Teamster. For making this long haul to Philadelphia the teamsters were paid £5.[45] From October to the end of

January, 1777, twenty-four twelve-pounders were successfully proved and hauled to Philadelphia.[46] Meanwhile the Congress had become somewhat impatient with the Grubbs for this delay in delivering cannon, and justifiably so. Robert T. Paine, a member of the Continental Congress, wrote to Colonel Peter Grubb, September 18, 1776, "By Capt. Joy I understand you have at last made some 12-pounders, but I fear they are heavier than they ought to be . . . . I hope you will make all expedition in making the cannon & getting them down, for they are much wanted".[47] It is possible though, that the conversion of the Furnace to the making of cannon instead of stoves and skillets proved more difficult than had at first been supposed. The re-training of the workmen was also a cause for the delay in delivering cannon to Philadelphia. Whatever may have been the reasons, Mr. Busteed was held responsible. Even though he proved his first cannon on August 25, 1776, he was not permitted to remain at Cornwall. On October 15, Busteed was tersely recorded by the clerk at Cornwall as being "off diet" and thereafter had no further connection with the Furnace.[48] To take the place of Busteed, the Congress sent one Captain Joy. He arrived at Cornwall prior to Busteed's departure,[49] and proved his first cannon on September 6, 1776. Captain Joy remained at Cornwall Furnace until 1780.[50]

The casting of "shot and shells" was another important contribution of Cornwall Furnace to the American Revolution. When the Grubbs received a request from the Congress to undertake the casting of shot, they again realized the inadequacy of their experience, and so imported several experienced foundrymen. Wiseberger and Williams composd one team, and Moore and Frazier the other. These men worked under the general supervision of Captain Joy.

The total amount of shot and shells produced by these men at Cornwall Furnace was 722 ten-inch shells, 162 eight-inch shells, 2700 twenty-four-pound shot, 2764 eighteen-pound shot and 6566 twelve-pound shot. The ten-inch shells weighed seventy-five pounds each, and the eight-inch shells weighed forty-two pounds each. The Grubbs received £45 per ton for these shells or a total of £1224.10.5. The large number of shot made totalled over eighty-six tons for which the Grubbs received £23.10 per ton or a total of £2026.7.9.[51]

The team of Moore and Frazier was credited with having made 805 eighteen-pound shot, 6078 twelve-pound shot, 2700 twenty-four-pound shot

and 162 eight-inch shells,[52] the remainder was cast by the team of Wiseberger and Williams.[53]

It may be noted from the figures above that the production of war materials by Cornwall Furnace in the Revolution was not inconsiderable. The other furnaces and forges throughout the State and country were also solidly behind the effort for independence. Dr. Bining has very ably summed up the contributions of the ironmasters to the successful prosecution of the war. "The development of the iron industry in the colonies made possible the success of the separation from the mother country. If the industry had not reached such a high stage of development, the colonists would have been helpless in the struggle. One of the outstanding factors which led to the successful terminus of the struggle, the importance of which cannot be overestimated, was the colonial iron industry which turned out cannon, shot and munitions for the Patriot troops as well as iron and steel for weapons which were used in the campaigns of the Revolution."[54] Cornwall Furnace was a vital part of this colonial iron industry during the American Revolution.

It is necessary now, however, to return to the workers of the Furnace. The salaries and wages received by these workmen varied greatly. Generally the manager was retained on an annual basis, receiving an annual salary which was far greater than the wages received by the average workman. For example, in 1792 James Boyd was the manager of Cornwall Furnace and received £100 salary,[55] and in 1800, Rudolph Kelker received £250 as manager.[56] In 1840, by which time the records of the Furnace were kept in dollars and cents rather than in pounds, shillings, and pence, William Shay received $700.[57] Casper Sherk in 1860 received $1,000 as manager for that year.[58]

The clerk of the Furnace was also a more permanent employee, hence received a salary rather than daily wages. In the eighteenth century, the clerk was generally hired on a monthly basis. In 1781, for example, John Stump served as clerk at the Furnace and received a salary of £40 per month.[59] In the nineteenth century, the clerk, like the manager, received an annual salary. James Moore, in 1800, received an annual salary of £75,[60] while in 1855, Joseph Pugh received a salary of $300 for the year.[61] The position of clerk at the Furnace was an advantageous one. When the manager died or left the Furnace for one reason of another, the clerk was sometimes promoted to manager, with a consequent raise in salary. David Hammond, in

1850, was clerk at Cornwall at a salary of $300 per year. By 1855 he was managing the Furnace at a salary of $700 per year with an additional allowance of $100 annually for a housekeeper.[62]

The wages paid to the workmen of the Furnace did not change a great deal in the eighteenth century, although there was a gradual rise in the wage level in the nineteenth century. This rise in wages was caused for the most part by an increased demand for iron in the making of iron products and by the rise in commodity prices.[63]

An exception to the above general statement is to be noted in the years of the American Revolution when for several years highly inflated wages and prices prevailed. Bar iron which in 1770 was sold for £26 per ton skyrocketed to £750 per ton in 1780; while an unskilled laborer who in 1770 received 40 shillings per month, in 1780 received from £45 to £65 per month.[64] It may be noted that while the rise in wages of some workers lagged behind the rise in the price of iron, on the average wages and prices increased at about the same rate.

Among the iron workers the founder received the highest wages. It was the custom in the eighteenth century to pay the founder according to the tonnage of iron he produced. This practice was followed at Cornwall until 1860. In that year the founder, Robert Nixon, was put on a regular annual salary of $425.00.[65]

During much of its history Cornwall Furnace employed one founder. For several periods, however, two founders were employed, one for the day shift of twelve hours, and one for the night shift of twelve hours. At the end of each blast, when two founders were employed, the number of tons of pig iron produced were multiplied by the agreed-upon rate per ton and the resulting sum of money divided equally between the two men.

The founder was not inclined to shift jobs frequently. He was more likely, on the contrary, to remain at one furnace for a long period of time. This was possibly a result of the long and careful study of the furnace made by the founder. Once familiar with the peculiarities of his furnace, the founder wished to remain with it and reap the benefits of his study and experience. That this is true of the founders at Cornwall may be seen in the following partial list of founders and the years during which they were credited

with having supervised the blasts of the Furnace. Unfortunately the list is incomplete, owing to the omission of the names of the founders in some of the records.

The earliest founder at Cornwall of whom there is any record was Samuel Patrick. In 1767 he agreed to be founder for "five shillings per ton for pigs" and "45 shillings per ton for stoves".[66] This rate of five shillings per ton for pig iron was maintained until the decade of the eighteen-forties, when the sum of 66 2/3 cents was fixed as the rate at which the founder would be paid. Thus it can be seen that until 1860 the annual earnings of the founder depended entirely upon his production.

The succeeding founders at Cornwall until the Civil War period, so far as can be learned, were as follows: from 1773 to 1776, George Foulk; 1776, David Short; 1800-1809, John Sheeler; 1808 to 1830, John Shay; 1830 to 1832, John Shay jr. and Joseph Nixon; 1832 to 1838, John Shay jr.; 1838 to 1841, John Shay jr. and William Shiner; 1841 to 1846, John Shay jr.; 1846 to 1847, John Shay jr. and William Ramsey; 1847, William Ramsey; 1848 to 1860, John Shay jr.; 1860, Robert Nixon; 1860-1867, John Shay jr. It is interesting to observe that for six decades, the Shays, father and son, were the founders at Cornwall.

The wages of the other Furnace workers varied greatly, depending upon the skill required for the job. The fillers or mixers, in 1776 received 80 shillings per month.[67] In 1830 the monthly wage was $16.00 per month,[68] and by 1865 it had been increased to $26.90 per month.[69] Keepers, who in 1772 received £5.15 per month,[70] in 1777 received £10 per month in inflated currency,[71] and $18.00 per month in 1830,[72] and $32.40 per month in 1865.[73]

Some conception of the real value of these wages may be seen in a comparison of the wages received with the annual rent or board paid by the workers. For example, in 1774 when the founder George Foulk received £300.11.6 in wages for the year, he was charged 32 shillings per month for boarding for a period of nine months and twenty-two days, or a total of £15.15.[74] In 1830 the fillers at the Furnace received $16.00 per month in wages, and paid $5.00 per month for board. If the filler in that year lived in a house owned by the proprietors of the Furnace, he paid a minimum of $10.00 annual rent.[75] Again, in 1865, the filler received $26.90 per month in wages, and paid $15.00 per month for board, or a minimum of $20.00 per year for the rental of a house.[76]

It is evident that the rent paid by the worker was increasing at a greater rate than were his wages, though this loss is alleviated by the fact that because shut-downs were fewer, he was enabled to work more steadily in 1865 than he was in 1830.

The real value of the wages received by the workers may also be determined by a comparison of these wages with the prices of several commodities used by all the workers and their families. The workmen received most of their earnings in goods supplied by the store owned and operated by the owners of the Furnace. Prices obtained in this "company store", however, compared favorably with existing prices in the Lebanon markets. For purposes of illustration, the years 1820 and 1865 have been selected as the years upon which to base an estimate. The available records for the prices of wheat and corn are most complete in these decades, so they have been chosen to demonstrate the rise in prices of commodities. Obviously, considerable caution must be observed in any comparison of this kind. As mentioned above, it is probable that the average worker was employed more regularly in 1865 than in 1820, whether he worked on a daily or a monthly basis. Hence his total annual income was higher at the close of the Civil War and he doubtless enjoyed a higher standard of living than the bare increases in monthly wages would indicate.

In 1820, a "mine pounder" received a monthly wage of $12.00, an amount which had increased to $33.60 in 1865, or an increase of 180 per cent. Ordinary labor at the Furnace was paid at the rate of $12.00 per month in 1820 and $32.00 per month in 1865, or an increase of 166 per cent. The wages of the keeper of the Furnace in 1820 amounted to $18.00 per month, and in 1865, $32.40 or an increase of 80 per cent, while the wages of the gutterman rose 94 per cent from $13.00 per month in 1820 to $25.20 per month in 1865. Experiencing the least rise was the filler whose monthly wages rose from $16.00 in 1820 to $26.90 in 1865 or an increase of only 68 per cent. In comparison to these prices and percentages, wheat rose in price during these same years from ninety cents per bushel in 1820 to $2.30 per bushel in 1865 for an increase of 155 per cent. The price of corn increased from forty-seven cents per bushel in 1820 to ninety cents per bushel in 1865, an increase of 91 per cent. [77]

It will be seen from these figures and others of a similar nature that could be cited, that on the whole real wages were rising as rapidly as com-

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modity prices, while in some individual cases the rise was more rapid, at least so far as Cornwall Furnace was concerned. Since the worker was not bound to work at the Furnace, but could leave whenever he chose, it is perhaps fair to assume that these wages were not lower than those paid generally in the Lebanon area, and so can be taken as fairly representative of the existing wage level.

It was the cold-blast charcoal furnace, of course, that occupied the center of the stage in the vast Cornwall estate. From it, for well over a century, came a tremendous amount of pig iron and cast iron products of many kinds. To it the Grubbs and for an even longer period of time the Colemans looked for much of their wealth. The entire Lebanon region for a half-century, until the erection of the Colebrook Furnace in 1791, was largely dependent upon Cornwall for its iron. It has been truly called "the backbone of early industry in Lebanon". Construction of this Furnace was begun in 1739 by Peter Grubb, who placed the Furnace in blast in 1742. He continued operating it for a period of three years when, in 1745, the Furnace and the Hopewell Forges were leased to a company of twelve persons from Baltimore who operated the Furnace under the name of "Cornwall Company". This company was succeeded by Jacob Giles, a Baltimore Quaker, who in turn was succeeded by Gurrit and Company in 1756.[78] From 1759 to 1762 or 1763 the Furnace was leased to John Rigby and Company, but was returned to Curtis and Peter Grubb when Rigby became interested in the Carlisle Iron Works later known as the Pine Grove Furnace.[79] In appearance the Cornwall Furnace was similar to other charcoal furnaces of the eighteenth century. It was built of native sand-stone into the side of a hill, just south of the ore hills. This practice was adopted generally so as to allow the iron ore, fuel (charcoal) and flux (limestone) to be put into the furnace stack from the top. The stack itself was square, tapering towards the top. It was thirty feet high, and had a bosh of nine feet.[80]

The casting house, built to cover the casting bed, was located in front of the furnace. In this "shed" as it was sometimes called, the molten metal from the hearth was run into sand molds and allowed to cool.[81] The tue-iron or tuyere, through which blasts of air were introduced into the furnace, was in an arched recess on one side of the furnace. Cornwall Furnace had only one tuyere, as did all of the eighteenth century furnaces.[82]

While the exterior walls of the stack were built of native sand-stone, the inside walls were made of the finest grained sand-stone available. This stone was found in considerable quantities in the Lebanon area.[83] Clay or coarse mortar was used to fill the space between the outer and inner walls of the stack. The "bosh", or central part of the stack, at Cornwall, was nine feet in width, and was wider than the inside walls above or below it. The reasons for this type of structure are evident. "When, in the evolution of the furnace, its height was increased the pressure of the superincumbent mass within rendered the materials so dense as to retard the ascent of the blast. Hence the internal buttresses or boshes were introduced to support the weight of the charge, relieving the central part from pressure and permitting the free passage of the blast."[84] At the bottom of the stack was the hearth, cylindrical in shape, into which the molten iron was allowed to run when the blast had accomplished its work of melting the ore, and consuming the limestone and charcoal in the stack. The hearth was only three to four feet in diameter because the molten iron had to be kept concentrated in order to prevent it from solidifying. The double bellows used at Cornwall to produce the necessary blast of air were made of leather and wood. They were about twenty feet long and six feet wide. The bellows were driven by water power furnished by the Furnace Creek.[85]

The process of starting the furnace, to "blow in" the furnace, as that process was called, was one that required considerable knowledge and patience. First, the stack was filled with charcoal and lighted from the top. Then when the fire had burned down to the tuyere opening the stack was filled again with charcoal. When the fire reached the top of the stack, the bellows were set in motion to begin the blast, and ore, limestone and more charcoal were dumped into the stack from the top. The limestone was used to flux the ore of its impurities. None of these ingredients were weighed before being dumped into the furnace. Baskets were used to carry them to the stack and the practiced eye of the "fillers" was the only "scientific" aid they had to determine the correct amounts of each to put into the furnace. Two or three days after the blast was begun slag and molten iron would begin to collect at the bottom of the stack. Then the proportion of limestone and ore to charcoal was increased until the furnace was working properly and the drawing-off process could be started.[86] This process can be followed easily in the Time Books of Cornwall Furnace. For example, in July, 1777, the following items appear: July 6, "put Fire in the Furnace"; July 8, "put up ore at 7 P.M.";

July 10, "Began to blow at 8 P.M.". Again it is recorded in May, 1783, on the 14th, "put fire in the furnace"; on the 15th, "put up oar"; on the 17th, "furnace in blast, 7 A.M.".[87] It will be seen from these examples, and others of a similar nature that might be listed, that from four to five days were required to get the blast underway.

The number of days or months during the year that Cornwall Furnace remained "in blast" varied considerably. During some blasts everything went exceptionally well, and during an entire season the furnace would be "blown out" and all operations stopped only two or three times.[88] Usually, however, and more particularly in the eighteenth century, considerable difficulty was encountered in maintaining the blast. The collapse of the inner walls, making the necessary repairs to the bellows, the freezing of the water in the race, all these are listed in the several Time Books as the reasons for "blowing out" the Furnace. In July, 1810, for example, the clerk at the Furnace records that a heavy rain which lasted an hour "filled up the Head Race and broke it in a number of places, broke into the Casting House and was within one inch of running over the Dam Plate into the Hearth, a great part of the walls of the Tail Race fell in and in short did so much damage by sweeping off the fences and filling up the ditch through the meadow and Mill Race that it required 20 men 4 days to repair it".[89]

The amounts of pig iron produced at Cornwall in its long career varied a great deal. Testimony offered in the "Appeal of Alden" indicated that the average yield of the Furnace at the beginning of the nineteenth century was between thirty and thirty-five tons per week. By the decade 1820-1830 average production increased to more than one thousand tons per year.[90] Many factors contributed to these variations. If the Furnace did not set properly, considerable time was lost in "blowing out" the Furnace and getting a new blast started. In some years, too much or too little rain would hamper operations. During times of business depression there would be a decline in the demand for pig iron and cast iron products.[91] Then, too, a gradual decline in production began when the more efficient anthracite and hot-blast furnaces came into production in the Lebanon region. Though there was always a considerable demand for "charcoal iron", the newer furnaces gradually produced more efficiently than the Cornwall Charcoal Furnace, a fact which caused the latter to lose customers and eventually to stop operations altogether.

In the eighteenth century the average annual production of pig iron was under one thousand tons at Cornwall. For example, in 1774, George Foulk, founder, was credited with having made 862 tons of pig iron during the preceding year. In addition, forty-three tons of castings were made, or a total production of 905 tons for the year 1773.[92] In 1790 a total of 661 tons of pig iron was produced.[93] The temporary decrease in production in the years after the close of the Revolution was largely caused by the general business depression, the need for reconstruction and the general political instability of the times. In the last decade of the eighteenth century the stage was set for a tremendous expansion of the iron industry.[94] In this expansion the Cornwall Charcoal Furnace was to participate.

A study of the records of the pig iron made at Cornwall Furnace in the nineteenth century reveals several periods of fluctuating production. In the first decade, annual tonnage of pig iron increased until in the season of May, 1809, to February, 1810, there was a total of 1294 tons of iron made, including five tons of castings.[95] In this year the Furnace was working exceptionally well. The highest number of pigs produced in one week was forty tons, and the lowest number sixteen. The average yield was about thirty tons per week.

In the decade and a half that followed, from 1811 to 1826, production gradually decreased until in the season of July, 1825, to February, 1826, there was only a total of 579 tons of pigs made.[96] In this latter year, the average weekly production decreased to about twenty-four tons. This decline may be attributed, in part, at least, to the general industrial and commercial dislocations of the Napoleonic era and to the effective competition in American markets by British-made iron products in the period after 1815. The American iron industry only slowly adopted the improvements invented by the British. Hence in the time-lag that resulted, British iron products undersold American iron products in American markets. This of course reached back to the furnaces and decreased the demand for pig iron.

However, in the season of 1826 to 1827, production again went above the thousand ton level, reaching 1120 tons for that season. Weekly production ranged from nineteen to thirty-six tons.[97] For the next two decades, 1826 to 1845, the Furnace produced pig iron at a consistently high level. Each year saw production exceed one thousand tons. Though of course the tonnage

fluctuated from year to year, the high water mark for Cornwall in all its existence was the season of 1844 to 1845. In that season, 1404 tons of pig iron were made.[98] Several years witnessed the production of more than thirteen hundred tons, as for example, in 1832 to 1833, the tonnage was 1338; in 1835 to 1836, 1348 tons; in 1839 to 1840, 1320 tons; in 1841 to 1842, 1321 tons; and in 1842 to 1843, 1395 tons.[99] So far as production was concerned it was during these two decades that Cornwall Furnace was at its peak. Weekly averages were high and shut-downs few. In this area, as will be seen in another chapter, the city and county of Lebanon were in an expansive mood. Industry generally was beginning to flourish. Population was growing and demand for pig iron was high. Cornwall Furnace both reflected and in part helped to create this increased activity of the Lebanon Valley.

From 1845 until the close of the Civil War the total annual production was lower than in the preceding twenty years, though for most of this period it remained above one thousand tons annually. In seven years of these two decades less than one thousand tons were produced. In 1849 to 1850, for example, only seven hundred tons were made, and in 1864 to 1865 only 888 tons.[100] Generally, however, production averaged between ten and eleven hundred tons.

The reasons for this decline in production are not difficult to understand. Until the decade of the eighteen-thirties, charcoal had remained the chief fuel in smelting iron ore, and most furnaces used cold air in the blast. In the next decade, however, the use of anthracite coal for fuel instead of charcoal was introduced, and the application of the hot-blast method was substituted for the cold-blast process. These changes revolutionized the iron industry in eastern Pennsylvania. In the Lebanon area, this change in the method of smelting iron ore occurred in the late forties and early fifties. Mr. Robert Coleman and Mr. George Dawson Coleman erected two furnaces in 1846 and 1847, known as the Lebanon Furnaces, No. 1 and No. 2. Both of these furnaces were anthracite furnaces using hot air in the blast.[101] In 1851, the Cornwall Anthracite Furnace No. 1 was completed and "blown-in", and in 1854, the Dudley Furnace in Lebanon was erected. These furnaces likewise were anthracite hot-blast furnaces.

The newer furnaces were larger and more efficient than the older charcoal cold-blast Cornwall Furnace and immediately demonstrated their efficiency

at the expense of the latter as the figures given above clearly show. Although the Cornwall Furnace was to continue in operation until February, 1883,[102] its post Civil War operations were not as extensive, nor was the Furnace as important to the region as it has been prior to 1850.

It should be noted, however, that the owners of the Charcoal Furnace made several attempts to increase its efficiency and thus to overcome its inability to compete favorably with the newer furnaces. In the summer of 1847, under the management of Mr. Samuel M. Reynolds, a small twenty horse-power steam engine was installed at the Furnace. This engine was used to drive the bellows and brought an end to the use of water power for that purpose.[103] The steam was generated in a pair of single cylinder boilers which were built on top of the Furnace on one side of the tunnel head opening. The Furnace gases, which formerly were wasted, were now deflected to the boilers to provide the necessary heat in generating steam. This venture was not successful immediately. The engine broke down several times in the next few years, and water power had to be used in each instance until the engine was repaired. As late as April, 1850, the clerk of the Furnace recorded, "blew with water".[104] From then on, however, the engine seems to have given no trouble for there are no further indications that the use of water power was again necessary.

At this time the Furnace was ranked eighth in total capacity and nineteenth in actual annual production among the fifty-nine furnaces then operating in eastern Pennsylvania.[105]

The second attempt to improve the competitive position of Cornwall Furnace occurred in the years 1856 and 1857. At this time the entire Furnace was thoroughly remodelled by the rebuilding of the stack, and the construction of a different method of securing the blast.[106] The new stack was built of native sand-stone, and, when completed, was twenty-eight feet square at the base, tapering to the top which was twenty-three feet square. It was thirty-one feet, eight inches in height, (the old stack, it will be recalled, was thirty-one feet high) and had a bosh of seven feet, as compared to a bosh of nine feet in the old stack. The number of tuyere arches was increased from one to three, but the cold-blast method was continued in use.[107]

In addition to these changes in the stack, the large and inefficient bellows were discarded, and two blowing tubs installed. The use of the tubs

made possible a stronger, and what was of even more importance, a steadier blast. "Of the many inventions in the technique of iron making at blast furnace and forge brought about in England during the last of the eighteenth century," says Bining, "the blowing tubs alone were used in America, and not a very large number of ironmasters in this country substituted these for the bellows prior to the close of the [18th] century." [108] The owners of the Cornwall Furnace were very slow in adopting this new technique. In the seventeen-eighties they had tried to make iron cylinders for blowing purposes but met with failure.[109] So it was not until a half century had elapsed that they decided to substitute the blowing tubs for the bellows. Even then, the tubs were constructed of wood and not of iron.

The construction and operation of these tubs are of sufficient interest as to warrant a brief description of them. All of the tubs or cylinders were built of wooden staves, bound together by hoops of iron in such the same fashion as barrels are made. The outside or main tub was placed in a vertical position and was securely fastened to a foundation so as to reduce vibration as much as possible. Its inside diameter was the same at all points, so far as that was possible, and was kept very smooth in order to eliminate all unnecessary friction. The "head" of this tub was made of heavy planks and was attached to the main tub so that an air-tight joint was assured. The head and the main tub were fastened to the foundation by two parallel planks extending on both sides of the tub to the upright foundation posts. Also to be found on each cylinder head were the suction or intake valve and the discharge or outlet valve. The valves were made of wood with a leather facing. Fastened to the valves were devices by which they were operated. In the case of the inlet valve, a pivotal counter-weighted lever closed the valve as soon as the suction action was stopped, and to the outlet valve, a spring was attached to close it when the compressed air had beeen delivered to the reservoir by means of a pipe into which the valve opened. Hence the head of the tub served several important functions in the blowing procedure.

The second or inside tub or cylinder acted as a piston, and was likewise constructed of heavy planks. Its outside diameter was slightly smaller than the inside diameter of the main tub so that it could be thrust in and out of the main tub with little friction and with the loss of little or no air. The piston was attached to the wooden connecting rod by means of a lug screwed into the base of the piston head. The connecting rod was attached to

the crank, also made of wood, on the large wheel. Both were used to convert the rotary motion of the wheel to the reciprocating motion needed by the piston to give it an inward and outward thrust.

The air compressed by this action in the two tubs was led through a pipe into an upright square wooden box located between them. It was known as the reservoir, and had a heavily weighted movable top which, acting like an accordian, assisted in delivering a fairly steady blast of air through the tuyere into the stack by means of a pipe about a foot in diameter.[110]

But all of these changes were of no avail. The era of the charcoal cold-blast furnace was drawing to a close. Demand for charcoal iron continued to decrease. The high cost of production seemingly could not be lowered, and the anthracite furnace continue to gain ground at the expense of charcoal furnaces. As will be seen below, profit margins became smaller and smaller, until finally, in 1883, operations at Cornwall Charcoal Furnace were brought to an end.[111]

In addition to pig iron, Cornwall Furnace, and other furnaces as well, cast "hollow ware", including such items as stoves, fire-backs, kettles, pots, skillets, and pans. The process of casting these articles was similar to that used in making pig iron. Instead of running the molten iron into beds of sand, however, it was ladled into previously prepared molds and allowed to cool. In place of sand molds, wooden molds were sometimes used; especially was mahogany preferred in making patterns because of its ability to withstand warping and cracking. Many of the articles cast in this fashion were plain and unadorned. Stoves, on the other hand, were often used to demonstrate the skill and originality of the founder and to add decoration to the colonial home. Biblical scenes and quotations, adages, or animals and flowers were the favorite forms of stove decoration of the founders. The name of the furnace and the year in which the stove was cast were also frequently included. The founder took considerable pride in his ability and originality. Some of these old decorated Cornwall stoves are still to be found in Lebanon County.[112] Until the end of the eighteenth century, in addition to pig iron, stoves were the most important items cast at Cornwall.

The German settlers in Pennsylvania introduced the use of stoves into the colony shortly after their arrival. Although most colonial homes continued to use the fireplaces for heating and cooking purposes, the number of stoves cast at the various furnaces indicates that the colonists, and especially

the well-to-do, were rapidly being converted to the use of stoves. Franklin invented his "movable fireplace" in 1742 and the idea caught on rapidly. Owing to his refusal to patent his stove, many ironmasters began to make similar stoves, all of which were known, however, as "Franklin stoves".

The stoves made at Cornwall were usually of the ten-plate and six-plate variety. These stoves were sold either to individuals who ordered them from the Furnace, or to merchants who resold them in the towns of the Lebanon area. At the time of the Revolution the stoves were sold at the Furnace for the sum of £5 each, or £25 per ton, except for the period of inflation in the seventeen-eighties, when they rose in price to £2250 per ton.[113]

It is impossible to determine the exact number of stoves cast at Cornwall. However, an indication of the extent of this activity of the Furnace may be seen in several examples of yearly production. In 1773, for instance, George Foulk, founder, was credited with having made 102 large ten-plate stoves, twenty-six small ten-plate stoves, twenty-six Dutch ovens, eight bake plates, four Franklin stoves, two still plates, eight still bars, and one Manville (axle), or a total weight of more than thirty-seven tons. For casting items of this kind the founder was paid at the rate of five shillings per ton.[114] In 1799, there was cast at the Furnace a total of 124 ten-plate stoves and five Rittenhouse stoves.[115]

In the nineteenth century the demand for stove-plates gradually diminished at Cornwall with the result that the Furnace turned more and more to supplying other needs of the area. Farmers used more implements made or edged with iron; forges increased in number and output and required more mold-plates and forge-plates; house builders began to install more windows requiring sash-weights. All of these and other needs created a demand for castings which Cornwall for a time could and did supply. Eventually, however, the forges displaced the Furnace in supplying many of these items.

As early as 1810 the drift away from the making of stoves can be seen. John Shay, founder in that year, cast more than four tons of such items as clock weights, mandrils (spindles), grate bars for slitting mills, forge-plates, and plates for a finery. In this year, he cast only six stoves.[116]

By 1820, the casting of stoves was entirely a thing of the past at Cornwall Furnace. It was now to be entirely occupied in the casting of pigs, mold boards and other requirements of the forges in the vicinity.[117] In

1830 Joseph Nixon and M. Fessler, moulders, cast three tons of forge-plates, mold-boards, gudgeons (pivots), grates, and weights.[118]

From this period of the thirties, however, until the Furnace was blown out for the last time, the casting of items other than pig iron was of little consequence. In the last inventory made at the Furnace in February, 1883, only the several grades of pig iron appear.[119]

In its long career Cornwall Furnace proved to be a very profitable enterprise both for the Grubbs and for the Colemans. Its successful operation, together with the development of the ore hills and other iron workers in the vicinity, enabled these two families to accumulate large fortunes. In 1786 Robert Coleman paid to Peter Grubb the sum of £8500 for a one-sixth interest in the Cornwall Furnace, and a one-third interest in the Hopewell Forges.[120] By way of comparison, and to show how the value of Cornwall grew with the years, in 1832, when the estate of Robert Coleman was settled by amicable proceedings, his son Thomas Bird Coleman, received Purport Number one including Cornwall Furnace and Estate, Colebrook Furnace and Estate, Hopewell Forge, and Speedwell Forge. This part of the estate was valued at $280,000, Cornwall Furnace itself carrying a valuation of $62,000. Another son, James, received Purport Number two, including Elizabeth Furnace, the total value of which was $270,000.[121] In 1864 the inventory of the Cornwall Furnace included the following items: forty-four mules, fifteen horses, thirteen mares, sixteen heavy wagons, fifty-six sets of harness, eighty-nine tons of charcoal pig iron at $40 per ton, 30,000 bushels of charcoal at five cents per bushel, and 2368 cords of wood at one dollar per cord. The total valuation was carried on the books of the Furnace as $65,000.[122] While it is true that steadily increasing values as expressed in inventories would not necessarily indicate continuous profitable operations, over the years profits would have to be fairly constant to permit the rise.

Another set of figures conveys an even better idea as to the profitable nature of production at the Cornwall Furnace. By a comparison of the annual year-end statements "Profits and Loss to Sundries" and "Sundries to Profits and Loss", it is to be noted that the Furnace was a very consistent money maker. After making all deductions for wages, material, repairs, and the like, all incident to the operations of the Furnace, and after making a seemingly endless number of withdrawals for personal and household expenses

a net profit was shown by the Furnace in most of the years in its long history.[123] In 1768 a net profit of £1839 was made.[124] When that figure is compared to the total valuation of the plantation in the year, £7074, it is readily seen that the Furnace was being operated very profitably by the owners. Not all years showed a profit, of course. Then, as now, the iron industry experienced years of "feast or famine", and there were occasions when losses were high and cash resources low. At such times even men like Curtis Grubb found it difficult to continue operations. A letter found in one of the journals of Cornwall Furnace illustrates this fact. John Miller, Bellows-maker, writing to Grubb on December 15, 1786 from Windsor Forge, said,

> "Sir, last time I saw you that we fixed a time for me to come in the spring to make your Furnace Bellows new tops or in the name of a half new pair, you might think the price would be but half, but for fear of missunderstanding I thot it prober to let you know that the making will be allmost as much worke as a new pair; though they have the name of a half pair but the price will be more than half, it may be about forty Pounts not much more nor much less, further I must let you know about my surcomstances that I have workt all summer about the Lower iron works and have not received as much money as to pay my hands. Some Money I shall loose and some iron masters I belief is broke and the rest swairs they have no money and if I worke one summer more at that rate I shll be broke too. I am willing to make your Bellows according to promise, but after they are done I must have the Money, otherwise I am not able to make them the hands that I have, they look emiededly for their money and sometimes before, think you know better than I do, pirhaps you may think that I might push on you for the money but you may belief me that this is not the kase as I will write you theirefore by this letter you may send me another or an answer as you think prober and I will attend you accordingly and theirfore I shall remain your friend and well wisher, so much from your humble servant."

But by and large, the Furnace produced in fine fashion for both the Grubbs and the Colemans until the middle of the nineteenth century.

As will be recalled, one of the most outstanding periods of production at Cornwall was the decade of the eighteen-forties. Hence it is not surprising that profits in that decade were high. It was in some ways the "golden age" of Cornwall Charcoal Furnace as the following figures clearly demonstrate. In 1840 net profits (a term loosely used to denote the differ-

ence between Profits and Loss to Sundries and Sundries to Profits and Loss) were $20,819; in 1842, $13,769; in 1843, $12,849; in 1844, the only year which failed to produce a five-figure net, profits were $8,433. In 1845 it rose again to $18,048 and in 1846 it was increased to $19,738. After a slight decline to $16,865 in 1847, profits reached $20,207 in 1848.[125]

Then, as one continues to read down the columns of the Journals, it is apparent that something unusual has occurred. Profits drop off sharply never to rise again to their former heights. The building of the anthracite hot-blast furnaces has made it impossible for the older charcoal furnaces to continue their fine record. In 1850 profits fell to $4,673; by 1855 they had fallen still more to $2,252; while in 1860 they rose only slightly to $3,226. In 1865, after charging off the huge sum of $56,680 for the building of a new "mansion", net loss amounted to $75,848.[126]

No further proof is needed to show that the days of the old charcoal furnaces were numbered. The interests of the Colemans were being transferred to their newer anthracite hot-blast furnaces. Even though it was seldom to produce a sizable profit for the owners, there remained a sentimental attachment for the "old stack" which gave it eighteen years more to live before it was finally closed down.

In addition to the Furnace, the Grubbs, and the Colemans, had other iron interests in the Cornwall area. For it was not only the Furnace that occupied the attention of these families, nor did it provide them with all of their wealth. Shortly after acquiring title to a tract of land in 1737 amounting to 171 acres, Peter Grubb built two forges known as the Hopewell Forges. Another forge, Speedwell Forge, though not built by Grubb, is rather closely associated with these two because it was later purchased by Robert Coleman. These three forges were located in what is now Lebanon County, in the area then known as Lebanon Township, Lancaster County. For many years these forges were to prove a valuable outlet for pig iron made at Cornwall Furnace and at Elizabeth Furnace. They were a continuous source of fine profits for their owners.[127] Peter Grubb and his sons lived at Hopewell for many years, and regarded the forge as their most profitable investment. Speedwell itself for a long period of time used more Cornwall pig iron than any other forge.[128]

The exact time of the building of the Hopewell Forges is not known. From all indications, however, they were managed as a unit. The location of these forges was on Hammer Creek about six miles southeast of Cornwall. This creek offered an abundant water supply, and from the heavily wooded section through which it flowed an ample amount of charcoal was obtained. It is commonly believed that these forges were built between 1737 and 1742.[129] In 1786, the purchase of Robert Coleman, described earlier, included a one-third interest in both of the Hopewell forges. In 1798 he bought another one-third interest from the estate of Curtis Grubb, and in 1803 he secured the remaining one-third interest from Henry Bates Grubb for the sum of £5182 Pennsylvania money.[130]

Upper Hopewell, the first to be constructed, derived its name from the fact that it was located several miles upstream from the second forge, known as Lower Hopewell. It is likely that Upper Hopewell was originally a bloomery or Catalan forge. These early bloomeries resembled blacksmith forges but were much larger. Ore from the Cornwall hills was brought by wagon to the forge and put into the hearth. During this heating process it was stirred with a bar until a semi-molten mass, known as a "bloom", was formed. The bloom was removed at an appropriate time and was then hammered into a heavy bar.[131] Obviously this was a very inefficient and costly process, wasting both labor and materials. But prior to the building of the charcoal furnaces nearby, the Cornwall Furnace and the Elizabeth Furnace, a forge of this type was the only source of iron for the area. Upper Hopewell remained in operation until 1803 when Robert Coleman abandoned it and transferred its custom to Lower Hopewell and Speedwell Forge.[132]

Lower Hopewell Forge was a chafery forge. Here the blooms from the Upper Forge were reheated and hammered into bar iron. After Cornwall Furnace began producing pig iron, bars would be fashioned from repeated reheatings of the pigs sent to the forge from the Furnace. These bars were large, at times as long as fourteen feet, and two inches in width. After cutting them into more convenient sizes they were sold to the blacksmiths and locksmiths of the vicinity.[133] Lower Hopewell was continued in operation until the middle of the nineteenth century by which time it was unable any longer to compete with the newer and larger forges and other iron works in this area. For a time, however, Hopewell Forge was an important outlet for pig iron produced at Cornwall Furnace. Especially was this true in the

first decade of the nineteenth century. In 1809 the forge consumed 332 tons of Cornwall pig iron and in 1810 the amount was 305 tons.[134] After 1850 the lands on which the Hopewell forges had been located were merged with Speedwell Forge. These lands, in 1832, amounted to 2071 acres of farms and woodlands.[135] For a period of a few months in 1766 Robert Coleman served as clerk at the Hopewell Forges. It is altogether possible that this energetic and far-sighted young man then realized the glorious possibilities inherent in the Cornwall ore hills, for this position was his introduction into the Cornwall region.[136]

The third of these forges, Speedwell, was erected by James Old[137] in 1760 on the Hammer Creek just below Lower Hopewell, on land formerly belonging to Elizabeth Furnace. Old maintained ownership of the forge until 1784. It was also a chafery forge similar to Lower Hopewell.[138] When Old left Speedwell to go to Reading Furnace in 1768, his son William took over the management of the forge.

In 1784 the forge was purchased by Robert Coleman from William Old, and from that date until 1854, when it was abandoned, it remained the property of Coleman or his heirs.[139] It was chosen as the customary place for the younger Colemans to learn the business of iron making. In 1797, William, the oldest son of Robert, was made manager of the forge at a salary of £250 per year Pennsylvania money. He remained there until 1801 when he was made manager of Cornwall Furnace, while his younger brother, James, came to Speedwell. In 1809, when Robert Coleman retired, the forge was managed, along with Elizabeth Furnace and Martick Works, by James Coleman and Company.[140] From 1822 to 1849, Benjamin Mooney, a name long associated with the Coleman interests, was at Speedwell, as clerk and manager. In the latter year he moved to the new Cornwall Anthracite Furnace built by R. W. and William Coleman. Mooney was succeeded by Artemus Wilhelm who remained at the forge until 1854 after which he became identified with the R. W. Coleman interests and later became one of the administrators of Coleman's estate. J. H. McClausland followed Wilhelm as manager and stayed at the forge until operations were stopped. He then became manager of the Speedwell Estate and Farm. In 1864 this estate was merged with the Cornwall Estate and thus was finally removed, officially at least, a name that for a long period of time had been symbolic of a phase of iron making in Lebanon County.[141]

As has been noted above, Speedwell for many years used more pig iron from Cornwall Furnace than any other forge. In 1800, for example, 627 tons of pigs were delivered to Speedwell as against 439 tons which were sold to John Weidman at Union Forge, the next most important consumer.[142] In 1840, Speedwell was still the chief market for Cornwall Furnace pig iron, for in that year 437 tons were sent to Speedwell, while the next largest amount, 200 tons, went to Samuel Irvin at Pleasant Garden Forge.[143] In 1848, the last year in which any appreciable amount of Cornwall iron was used, 468 tons were used at Speedwell, while 320 tons were sold to Union Forge.[144]

Since the only nearby competitor of the Hopewell Forges and Speedwell Forge during much of the eighteenth century was Newmarket Forge, it is evident that these Coleman forges supplied much of the fabricated iron for the Lebanon area. True, demand was not very great, but because it was an ever growing demand, these forges played a prominent part in the early industrial development of Lebanon County until they were forced to stop operations because of improved techniques which were being widely adopted at the more recently erected forges. In a more limited way, for the Coleman family, these forges proved their worth as a training "school" and a "proving ground" for several generations. If a young Coleman could successfully manage a forge for a number of years, he was considered capable of operating a furnace and so take his place as an "ironmaster".

NOTES

1. Grittinger, H. C., *op cit.*, Lebanon County Historical Society *Papers*, II, 12-14; ms. notes of Mr. Paul Grittinger, Lebanon County Historical Society.
2. *Forges and Furnaces in the Province of Pennsylvania*, 85. Quoted as "An indenture in possession of the Grubb family".
   Pearse, John B., *A Concise History of the Iron Manufacture of the American Colonies up to the Revolution, and of Pennsylvania until the Present Time*, 77, makes an unsupported statement that the Grubb family started iron business at Cornwall in 1728.
3. Robert Coleman v. Clement B. Grubb, July Term, 1856.
   Alden's Appeal Record, 88.
   The Cornwall estate eventually included some 22,000 acres in Lebanon and Lancaster Counties. Fifteen thousand acres of woodland and seven thousand acres of farm land comprised one of the largest contiguous estates in Pennsylvania. For a description of the farms on this plantation in the late nineteenth century, see Egle, *op. cit.*, 167-168.
4. Cornwall Furnace, Journal, 1798-1802.
5. *Ibid.*, 1832-1841.
6. Cornwall Furnace, Time Book, 1776-1785.
7. *Ibid.*, 1786-1794.

8. *Lebanon Courier*, August 14, 1847. In an unsigned letter to be found among the Furnace records appears the following: "Mr. Coleman [Robert W. Coleman] the proprietor, is a man of wealth, spares no expense that he may accomplish his wishes about him; has his grounds, particularly the garden (terraced) laid out in splendid style". Mr. Paul Grittinger attributes this unfinished letter to Casper Shunk who was clerk at Cornwall Furnace in 1850.
9. Cornwall Furnace, Provision Book, 1820-1872.
10. Cornwall Furnace, Journal, 1798-1802.
11. *Ibid.*, 1804-1822.
12. *Ibid.*, 1848-1868. In 1865, the "Head Miller" was receiving $600.00 per year, while his assistant received $32.40 per month. *Ibid.*
13. *Pennsylvania Colonial Records*, X, 636.
14. Cornwall Furnace, Journal, 1782-1785.
15. Cornwall Furnace, Time Book, 1832-1841.
16. Cornwall Furnace, Provisions, 1832-1844.
17. For example, on December 7, 1803, "Biddy McGarvey came to work in the kitchen". Cornwall Furnace, Time Book, 1794-1805.
18. *Passim.*
19. Cornwall Furnace, Time Book, 1776-1785. William Cook and Simon Flinn were both listed as "drunk" three days in August, 1785, while Robert McCadon lost six days for the same reason.
20. Cornwall Furnace, Journal, 1776-1782. Other workers, however, bought as high as ten quarts of whiskey in one month, and these men did lose work occasionally. On several occasions fights among the workers were caused by excessive drinking. On June 7, 1773, for example, "Phillips, Whig and Armstrong all absent from work last Saturday and Sunday, came home drunk and beat Pat McGuire, very ill". Cornwall Furnace, Day Book, 1771-1773.
21. Cornwall Furnace, Journal, 1774-1776. For a general treatment of indentured servants, see C. A. Herrick, *White Servitude in Pennsylvania.*
22. Cornwall Furnace, Time Book, 1776-1785.
23. Dunaway, W. F., *A History of Pennsylvania*, 221-222.
24. See Chapter II, above. In 1767, the names of some of the slaves at Cornwall were as follows: Emanuel, Charles, Pompey, Piero, Romulus, Scipio, Fullo, Sampson, Cato, Anthony, Jupiter, Bascus, Caeser, Cicero, and Governor Dick.
25. Cornwall Furnace, Time Book, 1776-1785.
26. Cornwall Furnace, Journal, 1764-1785, *passim.*
27. *Ibid.*, Time Book, 1786-1794.
28. *Pennsylvania Colonial Records*, X, 636.
29. *Ibid.*, X, 662.
30. Cornwall Furnace, Journal, 1776-1782. On April 30, 1777, the Hessians were paid "for 1 weeks work", £6.5.0.
31. *Ibid.*
32. Cornwall Furnace, Coal and Cordwood, 1776-1790. "May 24, 1777, Hessian prisoners cut 49 5/12 cords of wood."
33. Cornwall Furnace, Time Book, 1776-1785.
The names of some of these Hessians were Herolt, Blum, Fisher, Elias, Melchoir, and Seibert.
34. Bining, *op. cit.*, 81, 121.
35. *Ibid.*, 137.
36. Cornwall Furnace, Journal, 1776-1782; March 22, 1780, "for pasturage of sundry Continental Horses last fall, £68.5.0". In April, 1778, Grubb received £125 for stoves sent to the Continental Congress.

37. Lebanon County Historical Society *Papers*, II, 21. On June 25, 1774, the citizens of Lebanon Township met at the public house of Captain Greenawalt in the town of Lebanon, "to take into serious consideration the state of public affairs". Among the resolutions adopted at this meeting was "That Messrs Philip Greenawalt, Thomas Clerk, Michael Ley, Killian Long, and Curtis Grubb be a committee to collect contributions for our suffering brethren". *Ibid.*, The Hebron Diary During the Revolutionary Period, I, 8. Colonel Curtis Grubb was in charge of three hundred and forty prisoners that arrived in Lebanon on August 27, 1777. Grubb, however, got into serious difficulties with the Moravian pastor at Hebron, Brother Bader. Because of Grubb's high-handed tactics, Bader, in December, 1777, complained that "Grubb is, as we hear, like a madman against the poor brethren and us. He acts as absolute sovereign". *Ibid.*, I, 13.

38. Cornwall Furnace, Journal, 1776-1782; Time Book, 1776-1785, "On September 17 1776, Col. Grubb ret'd from Camp".
During this period Robert Coleman was operating Salford Forge in Montgomery County under a three years lease. *Forges and Furnaces in the Province of Pennsylvania*, 1-88.

39. Montgomery Collection, Lebanon Valley College.

40. Cornwall Furnace, Time Book, 1776-1785.

41. Cornwall Furnace, Journal, 1776-1782.

42. Cornwall Furnace, Time Book, 1776-1785.

43. *Ibid.* However, three weeks later, R. T. Paine, in a letter to Col. Peter Grubb, September 18, 1776, said, "The Cannon must be proved with two Shott, or they will never be put on board the ships". Lebanon County Historical Society *Papers*, II, 21.

44. *Ibid.*

45. Cornwall Furnace, Day Book, 1776-1782.

46. Cornwall Furnace, Ledger, 1776-1782.

47. Lebanon County Historical Society *Papers*, II, 21.

48. Cornwall Furnace, Time Book, 1776-1785.

49. *Ibid.*, 1776-1785.

50. Cornwall Furnace, Journal, 1776-1782.

51. *Ibid.*, 1776-1782.

52. Cornwall Furnace, Ledger, 1776-1782.

53. In the Ledger, 1776-1782, is to be found an Account Statement of Wiseberger and Williams.
"Wiseberger and Williams in Acct with Curtiss & Peter Grubb, Corn'l Furnace.

Dr.

Nov. 25, 1780,	To corn & whiskey	£ 0 3.6
Dec. 17,	To whiskey and tobacco	1.6
Feb. 5, 1781,	To pr. shoes	10.0
	To 1 cwt. Bar Iron pr order H. Forge dated 23rd Decr. 1780	1.17.6
	To cash paid Wiseberger, 8th Nov. '80	12.6
	To do do 25th Decr. in Lebanon	1.10.0
	To 4 mo. 2 d board of Wiseberger @30/	6. 2.0
	To 10 weeks 3 days do of Williams	3.18.0
	To a pr. Mitts	5.0
	To 4 mo. 2 days Pasture for Wisebergers horse	1. 4.6
	To 10 weeks & 3 days do of Williams @1/6	15.8
	To Danl Conners Bond deld Wiseberger	120. 0.0
		£137. 0.2

	Cr.	
By Making	488 12-lb. shot 52 ct. 1 qr. 4 lbs. 1959 18-lb. shot 314 ct. 3 qr. 10 lbs. Tons 18—7 ct. 0 qr. 14 lbs. @ £ 3.10	£ 64. 4.11
By making	722 10-in. shells wt. 75 lbs each, Tons 24— 3 ct. 2 qr. 0 lbs @ £ 5 pr ton	120.17. 6
By making	16 Dutch Ovens @ 3s.	2. 8. 0
By 12 days	Work of Wiseberger, acct. Flasks @ 5s	3. 0. 0
		£190.10. 5

54. Bining, *op. cit.*, 179-180.
55. Cornwall Furnace, Journal, 1791-1794.
56. *Ibid.*, 1798-1802.
57. *Ibid.*, 1832-1841.
58. *Ibid.*, 1848-1868.
59. *Ibid.*, 1776-1782.
60. *Ibid.*, 1798-1802.
61. *Ibid.*, 1848-1868.
62. *Ibid.*
63. Bining, *op. cit.*, 118-119.
64. Cornwall Furnace, Journal, 1770-1772; 1776-1782.
65. Cornwall Furnace, Journal, 1848-1868.
66. *Pennsylvania Magazine of History and Biography*, VI, 79.
67. Cornwall Furnace, Journal, 1774-1776.
68. *Ibid.*, 1822-1833.
69. *Ibid.*, 1848-1868.
70. *Ibid.*, 1772-1774.
71. *Ibid.*, 1776-1782.
72. *Ibid.*, 1822-1833.
73. *Ibid.*, 1848-1868.
74. *Ibid.*, 1772-1774.
75. *Ibid.*, 1822-1833.
76. *Ibid.*, 1848-1868.
77. All of the figures on wages and prices are taken from the Cornwall Furnace Journals, 1804-1822; 1822-1833; 1832-1841; 1841-1848; 1848-1868; and from Cornwall Furnace, Provisions, 1820-1832; 1832-1844; 1848-1872; and from Cornwall Furnace, Sundry Provisions, 1838-1842; 1850-1864.
78. Ms. notes of Mr. Paul Grittinger, Lebanon County Historical Society; *Forges and Furnaces in the Province of Pennsylvania*, 85; Acrelius, *op. cit.*, 165.
Giles paid an annual rental of two hundred and fifty pounds. Cornwall Furnace, Journal, 1764-1767.
79. *Forge and Furnaces in the Province of Pennsylvania*, 172; Egle, *op. cit.*, 131. Tax returns for Lebanon Township in the year 1719 show "Mr. Rigby (John and Co.) for Cornwell Furnice" £12.
80. *Alden's Appeal Record*, Coleman vs. Brooke, 269.
81. "Some imaginative early ironmaster compared the casting bed to a sow and her litter of suckling pigs. Thus the main stream or feeder from the furnace was called the

'sow", while the side gutters were called 'pigs', a term which is in use today." Bining, *op. cit.*, 80.

82. *Alden's Appeal Record*, 93 Pennsylvania 191. For a plan of a typical eighteenth century cold-blast charcoal furnace, see Bining, *op. cit.*, 78.
83. Schoepf, J. D., *Travels in the Confederation*, I, 198.
84. Bining, *op. cit.*, 79.
85. *Alden's Appeal Record*, 93 Pennsylvania 190. Lebanon County Historical Society *Papers*, II, 20.
86. Bining, *op. cit.*, 80.
87. Cornwall Furnace, Time Book, 1776-1785.
88. During the season of 1782, Cornwall Furnace was "blown out" twice. Time Book, 1776-1785.
89. Cornwall Furnace, Time Book, 1805-1825.
90. *Alden's Appeal Record*, 93 Pennsylvania 190.
91. This point must not be unduly emphasized, however. Production of pig iron in 1838, when the full effects of the panic of 1837 might have been expected, was only 126 tons less than in the previous year — 1093 tons as against 1219 tons. In 1839 production increased to 1320 tons. Cornwall Furnace, Blast and Pig Iron, 1832-1846. The "panic" of 1837, therefore, did not have a very great effect on production at Cornwall Furnace. The same thing is true of production in the years 1856-1857-1858. On January 15, 1858, the *Lebanon Courier* reported that in spite of the "hard times", Cornwall appears to be "lively", and all the furnaces were busy. Production in 1857 was only seventy-three tons less than in 1856, 1074 tons as against 1147 tons. In 1858 production of pig iron increased to 1265 tons. Cornwall Furnace, Blast and Pig Iron, 1848-1867.
92. Cornwall Furnace, Journal, 1772-1774.
93. Cornwall Furnace, Blast and Pig Iron, 1776-1792.
94. Bining, *op. cit.*, 181.
95. Cornwall Furnace, Blast and Pig Iron, 1807-1822.
96. *Ibid.*, 1825-1832.
97. *Ibid.*, 1825-1832.
98. *Ibid.*, 1832-1846.
99. *Ibid.*, 1832-1846.
100. *Ibid.*, 1848-1867.
101. See below.
102. The inventory of pig iron on hand as of February 12, 1883, showed the following figures:

No. 1	279 tons
No. 2	365 tons
Mottled	94 tons
White	38 tons
Total	776 tons

Cornwall Furnace, Blast Book, 1867-1883.

103. Cornwall Furnace, Blast Book, 1848-1867.
104. *Ibid.*, 1848-1867.
105. *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Cold Blast Charcoal Furnace in Eastern Pennsylvania.
106. Cornwall Furnace, Blast Book, 1848-1867.
107. Mss. of Paul Grittinger, Lebanon County Historical Society. Grittinger, H. C., *op. cit.*, Lebanon County Historical Society *Papers*, II, 29-30.
108. Bining, *op. cit.*, 82-83.

109. Hermelin, S. G., *Report About the Mines in the United States of America, 1783*, 63.
110. Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 30-31. I wish to express appreciation also to my father, an old-time iron founder, for his assistance in explaining the workings of the blowing tubs.
111. Despite all of these improvements, not even the demand for iron in the Civil War years was sufficient to bring back the previous high levels of production. In only two years, 1861 and 1864, did production mount above one thousand tons. In 1861, Cornwall Furnace made 1105 tons and in 1864, the tonnage was 1203. In 1865 production again slumped to 888 tons. Cornwall Furnace, Blast Book, 1848-1867.
112. Mercer, Henry C., *The Bible in Iron, or Pictured Stoves and Stove Plates of the Pennsylvania Germans*, 90, 130, illustrates with several cuts the stoves made at Cornwall; see also *Forges and Furnaces in the Province of Pennsylvania*, opposite p. 87.
113. Cornwall Furnace, Journal, 1776-1802.
114. *Ibid.*, 1772-1774.
115. Cornwall Furnace, Blast and Pig Iron, 1798-1807. For a description of Franklin's Stove, see Bining, *op. cit.*, 97-98.
116. Cornwall Furnace, Blast and Pig Iron, 1807-1822.
117. *Ibid.*
118. Cornwall Furnace, Blast and Pig Iron, 1825-1832.
119. Cornwall Furnace, Blast Book, 1867-1883.
120. *Muniments of Title of the Cornwall Estate*, No. 4, pp. 11-13.
121. *Ibid.*, 189-262, see especially pp. 261-262.
122. Cornwall Furnace, Journal, 1848-1868.
123. The custom of "tapping the till" for large and small amounts for personal use was apparently followed rather generally. Thus, in 1774, for example, a total of £142 was withdrawn for "House Expenses". This amount was in addition to the sum of £150 Curtis Grubb received as "salary", and wages paid to servants.
124. Cornwall Furnace, Journal, 1767-1768.
125. All of the figures listed have been taken from the Journals, 1832-1841; 1841-1848.
126. *Ibid.*, 1848-1868.
127. Pearse, *op. cit.*, 279.
128. Grittinger, *op. cit.*, Lebanon County Historical Society *Papers*, II, 14, 18; Cornwall Furnace, Blast and Pig Iron, 1776-1807.
129. Ms. of Mr. Paul Grittinger, Lebanon County Historical Society. In 1745, both forges were included in the lease given to the company of men from Baltimore.
130. *Muniments of Title of the Cornwall Estate*, Nos. 3, 4, 6, 7, 8, 9, 14, 15, 16, 18. In 1770, the forges were valued at £1563. Cornwall Furnace, Journal, 1770-1772.
131. Ms. of Mr. Paul Grittinger; Bining. *op cit.*, 76-77.
132. Ms. of Mr. Paul Grittinger; Hopewell Forge, Journal, 1803-1817.
133. Grittinger, *op cit.*, Lebanon County Historical Society *Papers*, II, 18; Bining, *op. cit.*, 83-85.
134. Cornwall Furnace, Blast and Pig Iron, 1807-1822.
135. *Muniments of Title of the Cornwall Estate*, pp. 209-212.
136. *Forges and Furnaces in the Province of Pennsylvania*, 87-88.
137. For a brief account of James Old, see *Pennsylvania Magazine of History and Biography*, XXXVI, 228.
138. *Forges and Furnaces in the Province of Pennsylvania*, 159.
139. Ms. of Mr. Paul Grittinger.
140. *Ibid.*; Speedwell Forge, Journals, 1784-1811.
141. Ms. of Mr. Paul Grittinger.
142. Cornwall Furnace, Blast and Pig Iron, 1798-1807.
143. *Ibid.*, 1832-1846.
144. Cornwall Furnace, Journal, 1841-1848.

THE LEBANON COUNTY
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THE RISE OF AN IRON COMMUNITY

AN ECONOMIC HISTORY OF LEBANON COUNTY, PENNSYLVANIA FROM 1740 TO 1865

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CHAPTER SIX

EARLY EXPANSION OF THE IRON INDUSTRY TO 1840

As fundamentally important as Cornwall Plantation was to the Lebanon valley in supplying the needs for pig iron and iron products which a growing population demanded, it was not destined to retain its position unchallenged, nor were the Coleman's to retain their complete hold on the industry, though they did continue to dominate it. This development became especially noticeable in the middle of the nineteenth century, but long before that time the iron industry began to spread to other parts of the area now included in Lebanon County. The early growth of the industry, in which at least three families in addition to the Coleman's, participated, may be explained in several ways. Growth in population was taking place in the central and northern portions of the valley rather than in the region of Cornwall and this growth produced a demand for iron products that could be satisfied by forges that were closer to the towns than were Hopewell and Speedwell. Then, too, there were several fine streams of water, the Quittapahilla, the Swatara, and the Monroe, to provide the power required to drive a forge hammer, and there was sufficient woodland to provide charcoal located in areas removed from Cornwall. Another determining factor in this development was the increasing realization that capital could be devoted profitably to ventures in the iron industry as well as in agriculture, a possibility that had been rather clearly demonstrated at Cornwall.

So, while the Coleman family was the most important contributor to the industrial life of the valley, and while it participated in the early growth of the iron industry, the period from the middle of the eighteenth century to the middle of the nineteenth century witnessed the entrance of new factors in the economic scene. Men with capital began to turn to the iron industry rather than to agriculture in order to produce profits; the workers of the valley found new opportunities for employment; and, while the point must not be unduly emphasized, competition began to make itself felt. With

but one exception this early development of the iron industry was concerned with the fabrication of iron rather than in the smelting of iron ore. Forges rather than furnaces were constructed, for they did not require as much land, labor or capital. Cornwall Furnace and later Colebrook Furnace supplied these newer forges with pig iron for most of the period to the eighteen-forties.

One other noteworthy development which occurred at the very end of this early period was the introduction of the iron industry into the town of Lebanon, which hitherto had not had a single forge or furnace. From this beginning the industry was to grow until Lebanon became one of the more important iron producing towns of the state.

Thus, at the end of the first century of its spread in the Lebanon area, the iron industry included, in addition to the furnace and forges mentioned in the preceding chapter, three forges, New Market, Union, and Monroe; one furnace, Colebrook; and one foundry, Phreaner's, in the town of Lebanon. Even then the iron industry was not, of course, to be thought of as "big business". All of these plants were comparatively small in capacity and in output. The position of agriculture as the chief means of livelihood was not yet threatened very seriously. On the other hand, however, this expansion, limited though it was, did set the stage for the tremendous development that was to occur in the decade of the fifties.

"New Market Forge, du grosses thier,
Du hust verschlungen schon drey oder fehr,
Tswa hust gefressen, der drit hust im rache,
Der fiert wirts ah net orrich long mache."[1]

This bit of verse which freely translated means

"New Market Forge, stupendous brute!
With three or four hast stopped thy hunger.
Two hast thou devoured, the third is in thy snoot,
Tis uncertain the fourth will last much longer."

was put on the hammer at New Market Forge about the year 1818, and serves to introduce into the story of the industrial development of Lebanon County, a forge that is noteworthy for two reasons in addition to its iron production. It was the first iron manufacturing establishment to be erected in the area after Cornwall Furnace was blown in, and it was the only iron works

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in operation in the eighteenth century that was not owned or operated at one time or another by the Grubbs or the Colemans. It is true that Robert Coleman served there as a clerk under James Old in 1767, but he or his heirs never became interested financially in the forge.

Originally known as the Quittapahilla Forge, it was erected on the Quittapahilla Creek about three miles north-west of the town of Annville, in what is now North Annville Township, Lebanon County, by Gerard Etter shortly after he acquired title to the land on December 16, 1747.[2] It is usually regarded as one of the forges referred to by Acrelius in 1756 when he wrote that Cornwall Furnace "keeps six forges regularly at work — two of his own, [Peter Grubb] two belonging to Germans in the neighborhood, and two in Maryland."[3]

The forge was destined to have a large number of owners who frequently did not operate the forge themselves but leased it to others. However, in its history many men of local distinction were connected in one way or another with the forge, not a few of whom were later associated with much larger and more imposing forges and furnaces.[4] In 1767 James Old leased the forge for a number of years and brought with him Robert Coleman. While he worked at this forge Coleman was able to save enough money to enable him to acquire a lease on Salford Forge in Montgomery County. The exercise of this lease was his first venture as an iron master.[5] In 1793, Adam Orth, a very prominent citizen of the town of Lebanon,[6] purchased the forge from Samuel Etter, the son of Gerard. The forge remained in the Orth family until 1797 when it was sold by Henry Orth to Henry Meyer who sold it to John Elder and John Kean in the same year. This partnership operated the forge until 1808 when Elder acquired the half interest of Kean. In 1811 Elder died and three years later his administrators sold the forge to Thomas Masterson who sold it after two years to Samuel Light. From 1816 until the forge was abandoned in 1875 or 1876, it was owned by the Light family except for a brief time in 1874 and 1875.[7]

However, the forge was frequently leased by the Lights to other operators. During the late thirties and early forties the firm of Lukens and Wood were the lessees. According to the testimony of Cyrus Light, a grandson of Samuel, it was this partnership who, in 1837, began to use the cinder

"banks" which had been accumulating on the property for eighty years. Previously regarded as an eye-sore as well as a total loss and a waste product, the cinder came to be regarded as a source of iron for the forge. The process of transforming the iron left in the cinder into a useful form comprised to several operations. The first task was to pulverize the cinder as finely as possible in a stamping mill. The powdered cinder was then resmelted in a hot blast crucible, along with an occasional charge of scrap iron. Then the entire molten mass was stirred into blooms weighing up to two hundred and fifty pounds, which after cooling would be put under the hammer. This process for a time proved to be very profitable and was quickly copied by other forges in the Lebanon Valley. It would appear that this result was possible only because in the eighteenth century the methods of forging were very inefficient and doubtless much of the cinder did contain a considerable quantity of iron which could be recovered by this process of a more efficient application of heat and a better knowledge of the technique of iron making. In any event it was a temporary boon to the iron masters of this area.

From 1846 to 1851 the forge was leased to Joseph Longenecker and John Early. This partnership is credited as having been very progressive in its operations. They were the first in the region to use coke as the fuel for the run-out fire instead of charcoal, and they made this change in 1851. They made their own coke in an oven on the forge property. Then, too, they were quick to observe the success of the experiments of G. Dawson Coleman at Martic Forge in Lancaster County in using anthracite pig iron instead of charcoal iron. G. D. Coleman was interested in the North Lebanon Furnaces, blown in in 1847 and 1848, the first anthracite furnaces to be built in Lebanon County. After seeing how successfully anthracite could be used by these forges, the example set by Coleman and the firm of Longenecker and Early was soon followed by other Lebanon forges. At this period of its long history, the forge had five fires and two hammers. Forty-five men and boys were employed at the forge. Its annual production was 225 tons of blooms and 125 tons of bar iron, most of which was sold in the local area.[8] It was at this time also that heavier hammers were introduced at the forge, the weight increasing from 500 to 1000 pounds and even more. In this practice, too, New Market Forge led the way in Lebanon County in an improvement that other forges soon copied.[9]

For a period of five years, 1853-1858, the firm of John Early, Henry Light and Cyrus Light leased the forge. The interesting feature in this period of operations was an attempt to make pig iron. In 1854 a small blast furnace was constructed and put into blast. According to the ore records at Cornwall, the experiment was carried on until 1857, but was largely unsuccessful. Cornwall ore was used almost exclusively, but after several years of failure, the attempt was abandoned and the furnace torn down.[10]

In 1858 Samuel E. Light took over the lease of the forge and two years later thoroughly remodelled it. The new forge had five fires and one run-out, a five ton hammer operated by steam power and had an annual capacity of 1300 tons.[11] Light continued to operate the forge with the exception of a few years until he moved to Lebanon and became interested in the Lebanon Rolling Mills.[12]

During its first century of operations the forge used Cornwall charcoal iron almost exclusively. For example, in 1799, Elder and Kean received 128 tons of pig iron at a cost of ten pounds per ton.[13] The firm of Lukens and Wood used as much as 221 tons of Cornwall iron in 1840, and 200 tons in 1842.[14] However, after the successful experiments with anthracite iron as mentioned above, after 1846, all of the pig iron used at the forge was purchased from the North Lebanon Furnaces.

The forge remained in operation for a century and a quarter, during which years, and especially down to the middle of the nineteenth century, it was a most important part of the industrial scene of the county. Its customers were almost entirely composed of the local farmers and artisans, hence for that part of the county in which it was located, New Market Forge was a center of interest and activity. Unfortunately for its owners, the building of the Lebanon Valley Railroad in the fifties and the subsequent rapid development of the iron industry in the town of Lebanon left New Market Forge on the fringe of activity. It found itself unable to compete with the larger and more efficient iron mills that were being erected, and though it continued in operation for a time, eventually the Lights gave up the struggle, abandoned the forge and transferred their interest to Lebanon. In that respect the experiences of the Lights were typical of many of the iron masters of the county, for there were to be but two centers in the iron industry eventually — Cornwall and Lebanon.

Union Forge was the second of several forges to be established in Lebanon County outside the immediate region of Cornwall, and was in continuous operation under several owners between 1782 and 1868. It was located about one mile south of the Swatara Gap, where the Forge Creek empties into Swatara Creek and at the intersection of two much travelled highways. One of them went northward through the Gap and southward to Lebanon and Philadelphia; the other went eastward to New York City and westward to Harrisburg and Pittsburgh. This intersection also lies at the point where the Swatara Valley and the Monroe Valley join the Lebanon Valley. In short, the forge had a very strategic location, and it was likely owing to that location that it prospered for so long a time.

The forge was built about 1782 by Curtis Grubb, the owner of Cornwall Furnace, on a tract of land which he purchased from Michael Straw. This tract contained about one thousand acres of land and was located along Swatara Creek in what is now Union Township, Lebanon County.[15]

Some operations were undertaken in 1782, since pig iron was sent from Cornwall Furnace to Nathaniel Grubb at Union Forge in that year.[16] Nathaniel Grubb was the son of the owner, Curtis Grubb. The latter, however, soon determined to erect a more modern forge on the site and in March, 1784, "Frederick Neeble and William Mummart began to square timber for the New Forge".[17] During the succeeding months the work progressed rapidly so that on the last day of the year, 1784, the workmen at the forge "draw'd the first Bar iron at Union Forge".[18] While the buildings on the forge property were built largely of wood, the foundations were made of native sandstone, ruins of which are still standing (1947).

The forge, in the years in which it was operated, underwent several changes in ownership. As was stated above, the original owner and builder, so far as the records indicate, was Curtis Grubb.[19] He and his heirs operated the forge until 1798, when on September 12, the executors of the estate of Curtis Grubb, namely John Wilkes Kittera, John Thome, Samuel Sinclair, and Ann Grubb, the widow of Curtis, sold Union Forge to Robert Coleman and his wife, Ann.[20] The purchase included one thousand acres of land, a blacksmith shop, a carpenter shop, a saddlery, a grist mill, and several houses, in addition to the forge proper.[21]

Coleman operated the forge for only a few years. Doubtless the fact that it was located so far from his furnace at Cornwall caused him to sell the forge in 1802. On November 4, 1802, Robert Coleman and his wife, Ann, sold Union Forge "as held by the said Curtis Grubb, Deceased", to John Weidman, his heirs and assigns for the sum of £8,000 "Lawful Money of Pennsylvania".[22] From that date the forge remained in the hands of the Weidman family until 1868.

Jacob Barge Weidman, the son of John, succeeded his father in the ownership of Union Forge. He was probably the most aggressive and influential of the owners and operators of the forge. Upon his death in 1857,[23] the Forge was operated by his heirs under the management of his son, Barge C. Weidman, who remained in charge until 1868 when the forge passed from the hands of the Weidman family. Under the management of Barge C. Weidman, Union Forge was subjected to many unfavorable conditions in the years during and immediately following the Civil War. Conditions of labor and markets were so disadvantageous that the forge was forced to close down.[24] It was subsequently operated for very brief and generally unsatisfactory periods by J. and R. Meily of Lebanon, and by Samuel Light of Lebanon, neither of whom, however, were at all successful. In the half century that has elapsed since the forge ceased operations, neglect, vandalism, and the purchases of junk dealers have conspired to reduce this once prosperous iron works to a state of total ruin.

The lack of an available labor supply for the forge became a problem before the end of the eighteenth century. The rapid development of the forge thus created a demand for more men which was met primarily by men who came from other parts of the valley and surrounding counties. The Forge Journal shows, for example, that men came to work at the forge from the region of Cornwall and from northern Lancaster County.[25] Their coming eventually increased the number of families who settled permanently in what was later to become Union Township. This is established by the fact that while no continuing community was created in the area about the Moravian Mission at Bethel, nor at the several trading posts in the "Kleine Loch" or "Little Hole", about four miles east of the Forge, nor in the area later served by the Monroe Forge, which stood about eight miles east in the Monroe Valley, a gradually growing community did spring up in the area surrounding Union Forge and continued

to grow, slowly, in influence and importance. This community took the name of "Union Forge".

The degree of permanence of the economic influence of the forge may be somewhat estimated by the number of local industries which sprang up around it, each having to depend upon the local market for the sale of their products. Ultimately included in the list were shoemaker shops, tailor shops, blacksmith shops, wagons works, and a brickyard. While few of these survived into the twentieth century, it is noteworthy that some of them did outlive the forge and serve the public long after the fires of the forge had died out. The advancing importance and influence of Union Forge is indicated still further by the fact that in 1830 the Union Canal Company built a spacious basin, with dockage and storage facilities close by the forge. Also, in 1870, the Lebanon and Tremont Railroad Company, having completed its railroad, deemed it advantageous to erect at Union Forge a building large enough to provide quarters for telegraph, freight, express, and passenger service.[26] The federal government also appointed a postmaster for the community and located the post office in the forge area. The railroad station and the post office are still in existence. The several large and exceptionally well built farm houses and barns which are to be found in the vicinity would suggest that agriculture, too, was well established, although farming in the northern part of the county was never as prosperous at it was in the central and southern sections. However, the agricultural enterprises were destined to last longer than the industrial establishments. In 1883 a large stone flour and grist mill replaced the old frame building that had served for so many years. This more recent building still stands on the forge property.

These industrial and agricultural developments gave to the entire community a feeling of social security which would be difficult to equal elsewhere than at Cornwall during the nineteenth century. So far as the records indicate, social contentment prevailed throughout the period. That there are no evidences of any labor difficulties at any of the small industries speaks well for the owners and employers as well as for the workers. This would, perhaps, also testify to the influence of the chief enterprise of the region — Union Forge.

This forge had, in 1850, four forge fires and two hammers.[27] It was built as a charcoal forge and remained so during its entire history. For power

to operate the bellows and to drive the hammers, the waters of the full flowing Swatara Creek were led through the race into the forge dam, and then passed over the forge wheel. The forge was engaged in the making of two major products, and, in a small way, manufactured several incidental items. Anconies and bar iron were the principal products. An ancony is a semi-finished iron product, bar-shaped, with unwrought ends. While some of these enconies were sold as bars, most of them were reheated at the "chafery" hearth in the forge itself and them hammered into finished products.[28]

Locally, the term "ancon" was also applied to some finished iron products, such as building anchors, supports, or ornaments. These were used in the construction of the sandstone and limestone buildings so common in the forge area. Many of these "ancons" may still be seen and found throughout the area surrounding the forge. They exist in various shapes and sizes — large and small crosses, esses, and rosettes, and are to be found most readily on the outside of the stone and brick end-walls of barns and houses. "Ancons" were used also to tie wooden window frames, joists and rafters to stone and brick walls, to fasten copings to the walls of dug wells. Some "U" shaped "ancons" may still be seen in the crumbling walls of the Union Canal locks, in the building of which they were extensively used. "Ancons" were considered an indispensible item of building material in the Lebanon Valley in the eighteenth and nineteen centuries, and there are but few buildings which were erected then and are still standing in which they may not now be seen or found. Their use in many instances in stone, brick, and wooden structures was quite similar to the use of iron in reenforced concrete structures of today.

The first ancony made at Union Forge was on November 23, 1784.[29] In the following year, 1785, a total of ninety three tons was produced. Most of the anconies of this year were made by Frederick Hare [or Herr] who received forty shillings per ton for his labor.[30] In 1793, Union Forge produced almost two hundred tons of anconies.[31] For the making of anconies, as well as the other products of the Forge, pig iron was bought from Cornwall Furnace, not only during the period when the Grubbs operated Union, but also during the nineteenth century when it was operated by the Weidmans. In the first sixteen months of its existence, Union used 231 tons of pig iron from Cornwall Furnace.[32] In the succeeding years the amounts of Cornwall pig iron delivered to Union Forge varied, of course, but a few figures, selected at random, show

that Union was not only a steady customer of Cornwall Furnace, but also that for the first half of the nineteenth century it was one of the principal customers of the Coleman interests. In 1800, Cornwall delivered 439 tons of pig iron to John Weidman at Union Forge.[33] In this year only Speedwell Forge, one of Coleman's forges, required more pig iron than did Weidman, receiving 627 tons. In 1809, Weidman received 292 tons of pig iron,[34] again being second on the list of customers of Cornwall pig Iron. In this year only Hopewell Forge required more pigs than did Weidman. In 1847, Jacob Barge Weidman bought 320 tons of pig iron from Cornwall.[35] As a matter of record Union Forge was still the second largest user of Cornwall pig iron, Speedwell Forge being again the largest consumer.

The Forge also produced large quantities of bar iron which was sold, primarily, to independent small industries. These latter then converted it into other commodities, such as horse-shoes, iron parts for wagons and sleds, hinges and locks for doors, farm implements, nails and bolts, tools and the like, all of which could be produced by the several types of shops which then were representative of every small community. There are but a very few of these small, independent, local shops now doing business. But there are to be found in the Forge area ruins of shops that at one time were prosperous. Among them are the old time blacksmith shops which were once the center of much activity. To them came farmers to have their horses shod, tools redressed, and while waiting their turn for service, to chat with their neighbors. Traditionally, too, other business transactions were consummated at the fires of the shop, such as horse trading or selling, and the selling of farm implements.

On December 31, 1784, the first bar iron was drawn at the Forge, and by 1787, some 120 tons were being made annually.[36] Since the rated annual capacity of Union Forge was only 150 tons of bar iron in the nineteenth century,[37] this early production would seem to be excellent. During the decade period to the Civil War, Union Forge was operating at full capacity.[38]

For a brief time, also, the Forge acted as an outlet for castings made at Cornwall Furnace, though this practice seems to have stopped with the taking over of the forge by the Weidmans. In the period from 1785-1786, for example, Dutch ovens, skillets, six and ten plate stoves were sent to Union to be sold.[39]

The number of men employed at Union Forge varied from time to time, owing to the variable demand for ancons and bar iron, and to the fact that water power was lacking during the winter months. For some months in 1783 and 1784, while the Forge was being erected, the record of the time worked by some of the men at Union Forge was kept at Cornwall. "John Campbell at Union Forge most this month and kept here on Time. Negro Governor Dick at Union Forge", recorded the clerk at Cornwall in May, 1783.[40] Altogether some thirty men were employed in the building of the Forge. They included carpenters, stone masons, teamsters, and the like.[41]

After the Forge began to operate, the Time Books indicate that during the summer months when the Forge was in full blast, from twenty-five to thirty-five men were necessary to operate the Forge and the plantation. This number tapered off to some eight or ten during the winter months.[42] These figures included those men and women who worked in the fields and in the shops as well as those who worked at the Forge itself. They also included the school master that Grubb had provided for the children of his workers. "July 31, 1789, John Bell, school master, was paid three pounds."[43] The numbers employed at the Forge remain fairly constant during the nineteenth century, averaging about thirty employees during the summer months.[44]

Wages paid at the Forge show frequent fluctuations. In some cases, as was common at the time, only cash wages were paid, in other instances, the wages paid included cash and "found".[45] Then too, agreements were sometimes changed rapidly, evidently to recognize more or less work being done at the Forge. For example, within the space of five months in 1784-1785, one William Armstrong made three separate agreements with Curtis Grubb.[46] On December 8, 1784, he agreed "to work at Union Forge for forty shillings a month for four months". Twelve days later a new agreement was reached providing for a wage of only twenty shillings a month. Finally, on May 19, 1785, "C. G. [Curtis Grubb] agreed with Wm. Armstrong to Stock Coals at 50/ per mo. for Six months". The more permanent employees in this same period were hired on the customary annual basis. "Mr. Bevan commenced business at Union Forge on Tuesday the 4th September, 1787 for 1 year at £100 pr Annum and 25 to Mrs. Bevans for House Keeping."[47] The blacksmith too was hired on an annual basis, receiving £48 per year for his services, while the Forge carpenter received £60 annually.[48]

In order to place these wages in their proper light, it may be well to cite the prices of a few articles which prevailed in the last two decades of the eighteenth century. In 1789, for example, corn sold for four shillings per bushel in the vicinity of Union Forge, while wheat brought seven shillings six pence.[49] So that, expressed in terms of wheat, for instance, the manager of the forge, Mr. Bevans, received the purchasing power of 267 bushels of wheat, while the blacksmith received the purchasing power of 128 bushels.

It is difficult, for one who stands at the ruins of the old forge today, to believe that there was once bustling activity at this place. The Forge is gone, but it has left in its stead lasting influences upon the community which is served. In what must have been a very mellow mood, Joseph Grubb wrote in the Union Forge Time Book, in September, 1786.

> "Jos. Grubbs delicate Prose.
>
> "Gristmill Sawmill and every wheel Belonging to the forge Employed at the same Time with a full flowing stream of Water. To be Compared to a Ship at sea which had a long passage occasioned by a head wind and then a fair Wind and Every Sail full. Joy and Likely to continue."

He was a poor prophet, of course, but does he not somehow reflect the temper of the late eighteenth century? To the writer, his "delicate Prose" typifies the satisfaction of accomplishment which so characterized that era.

After successfully operating the Cornwall Charcoal Furnace for several years, Robert Coleman was convinced that there was room for another furnace in the Cornwall area. So he decided to erect another cold-blast charcoal furnace. He selected as the site of this new furnace a spot on Conewago Creek, six miles to the southwest of Cornwall. The choice of this spot was determined as usual by the accessibility of the supplies of materials necessary for the furnace. Fuel was obtained in the nearby woodlands of the South Mountains. There was also in the region selected an abundant supply of red sandstone suitable for building purposes. The Conewago Creek supplied the necessary power to operate the bellows. Quite naturally Cornwall iron ore was used.

During the first year of its existence, April, 1791, to April, 1792, the furnace was named "Mt. Joy Furnace"[50] In April, 1792, however, the name was changed to "Colebrook Furnace", and "Colebrook" it remained until

the final blast was made in 1858. This change in name was made, most likely, because of the fact that, just over the mountains, in the neighboring county of Lancaster, there was a village bearing the name of Mt. Joy. The resulting confusion of names could best be avoided by changing the name of the furnace. The settlement which grew up around the furnace has been known as "Colebrook" to the present time.

Robert Coleman continued to operate Colebrook Furnace until his death in 1825. At that time, by the terms of his will, Colebrook Furnace and Estate became the property of his youngest son, Thomas Bird Coleman.[51] In 1836 Thomas Bird Coleman died, intestate, at the age of forty-two. When his two sons, Robert W. Coleman and William Coleman, became of age, amicable proceedings were instituted in the Lebanon County Courts to partition the estate of their father. The decision given in this case awarded Colebrook Furnace to William Coleman,[52] who continued to operate the furnace until it was blown out for the last time in 1858.

Construction of the stack of the furnace was begun on May 24, 1791, and was completed in November of the same year. The other buildings necessary for the operation of the furnace were also built at this time, including the coal-house and stables. Owing to the difficulties of operating the furnace in the winter season — the freezing of the Conewago Creek and impassable roads — the first blast was not made in this furnace until April, 1792.[53]

In appearance the furnace was similar to other charcoal furnaces of the eighteenth and nineteenth centuries. It was constructed of red sandstone and was built into the side of a hill in order to permit easy filling of the furnace. The stack was thirty feet in height and had a bosh of nine feet.[54] Cornwall ore was used exclusively and was hauled to the furnace from the "hills" over the so-called "Mine Road", sections of which can still be seen. The original cost of the furnace was £2600.[55]

During the first decade of operations, Coleman experienced considerable difficulty with the furnace walls. For example, from the time of the first blast, April, 1792, to April, 1793, the furnace was "out of blast" three times because of the collapse of the furnace walls. Other years of the decade witnessed similar difficulties.[56] While these difficulties must

have been discomfiting to the owner, he apparently enjoyed some good-natured joshing about it at the expense of his friends. For in April, 1794, he wagered £50 against £25 with Samuel Shower and John Brien, "that Colebrook Furnace will not remain in blast for one year from the first day of the next blast, accidents excepted".[57] While the Time Book gives no indication of the result of this wager, an examination of the blasts of the year which followed reveals that the furnace was blown out four times, though for what reasons is not recorded. In the nineteenth century these early difficulties were overcome, and consequently there is a decline in the number of times the furnace is out of blast owing to falling stack walls.

The chief product of Colebrook Furnace, as it was at Cornwall, was cold blast charcoal iron.[58] During the early years of operation, the production of pig iron averaged twenty tons per week, or about eight hundred tons per year.[59] By the end of the first decade of the nineteenth century, the output of pig iron had been increased to thirty tons per week, or about twelve hundred tons per year,[60] Production was later increased to fourteen hundred tons annually, which doubtless was its capacity[61]

From the beginning, most of the pig iron made at Colebrook was sold to forges nearby, or those of Berks, Lancaster and York counties. Spring Forge in Berks County, Codorus Forge in York County, and Martick Works in Lancaster County were among the chief customers of the furnace.[62] As these forges discontinued operations or were supplied by furnaces in their own regions, Colebrook iron was sent to various brokers in Philadelphia, just as was Cornwall pig iron.[63]

In addition to pig iron, many castings were also made at Colebrook. Among the articles most frequently cast were kettles, stoves, ovens, bake plates, sash weights, and plow plates. In 1824, for example, 113 stoves were cast including such picturesque patterns as *Colebrook*, *Elizabeth*, *York*, *Small's*, *Lafayette*, *Franklin*, and *Square*. The total weight of these stoves and the other incidental castings made in that year was 250 tons.[64] Thus it may be noted that the products of Colebrook Furnace were about the same as those of Cornwall. Most of the castings of Colebrook were made for the local market.

The number of men employed in various capacities at Colebrook varied from an average of forty in the first decade of operations to sixty in 1850.[65]

Absences from work were common as was the case in other iron works. Sickness, drunkenness, and "boils" were the reasons most frequently given in the Time Books for these absences. Occasionally, however, the workers were absent for other reasons, showing that all was not work and no play at Colebrook. For example, on August 24, 1805, several men were "off work, went to a horse race at Millerstown", [Annville] and on May 16, 1807, some of the men went to a "Campmeeting near Cornwall".[66]

On the whole it may be said that operations at Colebrook were profitable. Although this furnace, like all others of its kind, showed the fluctuating cycle of prosperity and depression, profits in many years, equalled those of Cornwall.

After the middle of the nineteenth century, the years of all cold-blast charcoal furnaces were numbered. They were being replaced rapidly by furnaces using anthracite coal for fuel and hot blasts of air rather than the cold blast previously used. With the erection of the Cornwall Anthracite Furnace in 1851 by Robert W. Coleman and William Coleman, it was only a matter of time until Colebrook would be shut down. The Anthracite Furnace was successful almost immediately, and in 1854 the Messrs. Coleman added another stack to the original one. Realizing that there was more profit to be made by the newer furnaces, William Coleman ordered a cessation of operations at Colebrook Furnace in 1858. During the next two years it was gradually dismantled so that by 1860 every vestige of iron making was gone. The village, the mill, the "mansion", and stables were allowed to stand and then became known as the "Colebrook Estate". This Estate remained in the hands of the Coleman family until 1898, when it was sold by the assignees of Robert H. Coleman, a great-grandson of the original owner of Colebrook.[67]

During its career of sixty-seven years Colebrook Furnace had served its owners well. Of all of the various iron works owned by the Colemans in the first half of the nineteenth century, it was overshadowed, of course, by Cornwall Furnace, and the several anthracite furnaces erected by several members of the family — the Cornwall Anthracite Furnaces, and the Lebanon Furnaces. But as a cold-blast charcoal furnace, Colebrook ranked with the best. Of the fifty-nine cold-blast charcoal furnaces listed in eastern Pennsylvania in 1850, Colebrook ranked fourth in capacity and fourth in actual production.[68]

The furnace is best remembered, however, in the local region, not for the prominence of its owners, important as they were, nor for the products made, but for the fact that two men who later became well-known were at one time or another associated with the operation of the furnace. The first of these men was Mr. Samuel Jacobs, the first resident manager of the furnace. He remained as manager until his death in 1819, and was familiarly known as "Squire Jacobs". This is the "squire", it is commonly believed, referred to in the well-known "The Legend of the Hounds".[69] According to this poem, written by George H. Boker, the "Squire" was a very cruel and drunken tyrant who was hated and feared by all the families at Colebrook. In spite of his reputation, however, he seems to have taken great delight in a fine pack of dogs, led by one "Flora". This pack was used by the "Squire" on his many hunting expeditions. When upon one occasion, some of his friends expressed doubt as to the ability of these dogs in hunting, he arranged a special hunt for them. On this particular expedition the dogs, for some strange reason, refused to run in their customary way. The "Squire" became so violently angry that he drove the dogs, one by one, into the blazing furnace. From that time on, the "Squire" was a changed man. He lost his friends and gave up hunting. He spent most of his time sitting in a chair and drinking. He imagined that the pack, led by "Flora", was returning to him.

> "Here they all come, the hellish pack,
> Pouring from Colebrook Furnace, back
> Into the World! Oh, see, see, see!
> They snuff, to get the wind of me!"

Finally, one day, he leaped to his feet, ran around the room a few times, and dropped dead.

> "Still Colebrook Furnace grimly stands,
> Waving its plume o'er Cornwall's lands,
> Blighting the air with poisoned breath,
> Spreading the bounds of waste and death.
> Its slag and cinder, dry and dun,
> That nothing green will grow upon;
> Still like a hoary king, it rears
> Its head among its dismal peers;
> Still at its glowing feet are rolled
> The floods that turn to wicked gold;
> Still beasts, birds, reptiles shun the place;
> And the man alone will do it grace;

The Squire and all his race are gone;
But this wild legend still lives on.
Christ save us from the wretched fate
Of him who dared his wrath to sate
On God's dumb creatures, as of old
Befell the Squire of whom I told!"

There are no records to substantiate this legend, and similar stories have been told of other iron-masters, but "The Legend of the Hounds" has immortalized Colebrook Furnace for succeeding generations of those interested in Lebanon County history and folk-lore.

The second of the managers of Colebrook Furnace who was of more than passing interest was Henry P. Robeson. He came to Colebrook in 1834 as clerk and from 1836 to 1843 was manager of the Furnace. In 1843 he went to the Reading Furnace in Berks County. In 1845, he, along with Clement Brooke of Birdsboro, bought the latter furnace which included the ore rights of Cornwall of the Grubb family. In 1855 the town of Robesonia, Berks County, was laid out and named in his honor. The name of the furnace was also changed at this time to Robesonia Furnace.[70]

By the fourth decade of the nineteenth century, the population of northeastern Lebanon County had increased to such an extent that Jonathan Seidel believed it could support an iron works. Seidel came to Lebanon County in 1835 from Robeson Township, Berks County, where the Seidel family had been engaged in the making of iron for a half century.[71] On October 8, 1835, Jonathan Seidel bought a tract of land from Jacob Böhny and his wife Magdaline, in order to erect a forge on the site. This tract comprised 250 acres of land, a saw mill, several buildings and houses.[72] This tract of land, and subsequently the forge, was located in the Monroe Valley which lies between the Little Mountain and the First Mountain of the Blue Ridge, in Bethel Township, about three miles northwest of Fredericksburg.

Jonathan Seidel continued to operate the forge until March 27, 1853, when he conveyed the entire property to his son, Henry B. Seidel, who for some time previous had been associated in the business with his father.[73] From 1854 to 1861, the forge was operated by Henry B. Seidel, although in 1856 he sold one third interest to Phillip W. Killinger and the firm name was changed to Seidel and Killinger. In 1861, Seidel sold his remaining two

thirds share of the business to John W. Killinger,[74] who in 1864 purchased the one third interest of Philip W. Killinger. In March, 1866, Philip W. Killinger reacquired the entire property and operated the forge from that time until it was abandoned in 1868. The property was subsequently subdivided and sold by Henry Shenk and William W. Killinger, assignees of Philip W. Killinger.[75]

Monroe Forge was a charcoal forge. It had a run-out, three forge fires, and one hammer. Water power to drive the bellows was derived from the Monroe Creek. Wood for charcoal was easily obtained from the mountains which surrounded the forge. The forge produced three hundred tons of blooms per year, from which bar iron was made. Most of the products of the forge were made for local customers, blacksmiths and farmers, though some bar iron was sent down the Union Canal to Philadelphia.[76]

In 1837 after the forge had been in operation for several years, Jonathan Seidel decided to expand his activities by erecting a cold-blast charcoal furnace. Up to this time, he had been purchasing pig iron from Cornwall Furnace.[77] He apparently believed that all of the necessary resources for the smelting of iron ore were close at hand. It may be recalled that, at this period, claims were being advanced that iron ore was to be found on many of the farms of the county. According to tradition, Seidel used the ores of some of these short-lived ore diggings in his furnace. The Monroe Creek would furnish ample water power, he thought, and the mountains offered a bountiful supply of wood for charcoal, over and above the needs of the forge. Apparently Seidel was convinced that a charcoal furnace in the northern end of the county would be very advantageous not only to the owners, but to the community as a whole. He possibly had the ambition of becoming the "Coleman" of northern Lebanon County. In any event, the charcoal furnace would save him the long and expensive haul of pig iron from Cornwall to Monroe Forge.

It was the third furnace to be established in Lebanon County. It was of the usual cold-blast charcoal type, though considerably smaller in capacity than eitheer of the other two furnaces — Cornwall and Colebrook. Native mountain stone was used in its construction and it had a stack of thirty feet, and a bosh of seven feet.[78] Since the largest output of the forge was three hundred tons per year, and the furnace produced five hundred tons of pig

iron annually,[79] Seidel at best had about two hundred tons of pig iron to sell to other forges in the surrounding region or to ship to the Philadelphia market by way of the Union Canal.

The furnace did not long remain in operation. As early as 1846, Seidel was again purchasing some pig iron from Cornwall Furnace,[80] and within three years Monroe Furnace was permanently out of blast.[81] The forge, however, as has been noted above, was continued in operation until 1869.

Thus within the space of thirty years, an iron industry had come and gone. Bright as may have been the prospects for the Seidel family when they undertook operations, the most plausible explanation for the failure of their enterprise appears to be the following.

A glance at the map of Lebanon County will show that the location of the forge and furnace was not all favorable, despite the optimism of Mr. Seidel and his successors. Located in a relatively inaccessible section of the county, transportation of raw materials and of the finished iron products must have been always a difficult problem.

The confidence which Seidel displayed with regard to raw materials was misplaced. Ore beds which looked very promising on the surface were quickly exhausted. There is but one "Cornwall" in Lebanon County! Then, too, as Seidel was to learn by experience, the Monroe Creek was not strong enough to operate both the forge and the furnace.

It is reasonable to suppose that the many transfers of this property was occasioned in part, at least, by a lack of capital resources to withstand a year or two of operating losses. At a time when elsewhere in the county and state, iron managers were expanding their physical plant, installing steam power to replace water power, and were using the hot-blast method of ore reduction rather than the cold-blast method, the owners of Monroe Forge and furnace clung to the old method They just could not compete with the more modern furnaces and forges. Doubtless the presence of Union Forge in the same area served to reduce the potential and actual market for Monroe iron products, for Union had preceded Monroe by fifty years and had a well established custom. The area of northern Lebanon County simply could not support two forges.

Thus far in describing the early development of the iron industry of Lebanon County, it will be noted that the town of Lebanon did not participate in this expansion. In fact, it was not until 1840 that the industry made its appearance in the town. The absence of an iron industry in Lebanon in the century that elapsed from the time of the erection of Cornwall Furnace to the time of the building of the first foundry in Lebanon may be accounted for, in part at least, by the economic conditions which prevailed in the town. As the editor of the *Courier* so frequently charged, the town was "asleep" economically.[82] Men of capital were not convinced that the iron industry could be profitable in any other phase than the smelting of iron ore and the county had enough furnaces, so they thought. The tendency to rely wholly upon water power rather than steam power precluded the building of forges and foundries on the Quittapahilla Creek which flowed through the town, because that Creek was already driving several flour mills. Poor transportation facilities likewise deterred the men of Lebanon from building any iron works. But the advantages of steam power could not be denied by men who had seen steam engines at work in other communities. Then, too, in the decade of the eighteen-thirties, the Union Canal had shown that it could be used advantageously in transporting products to and from Lebanon. The teams from Cornwall Furnace had become a common sight as they passed through Lebanon on their way to the landings at North Lebanon, and thus helped to stir the men of capital in Lebanon to activity.

In 1840, Dr. Benjamin Phraener, a practicing physician in Lebanon, decided that the town could profitably support an iron foundry. In that year he erected the first iron works in Lebanon.[83] It was located on the Pine Grove Road, now Seventh Street, one block north of Cumberland Street. This site had many advantages. The Pine Grove Road was the main road running to the north from Lebanon over which the farmers from the northern part of the County came to Lebanon on market days, during Court sessions, and on the several holidays of the year. The foundry proved to be a very convenient stopping place for farmers coming in to the town, for there they could have their stoves or plows repaired while they transacted other business in town.

The tract of land on which the foundry was built contained about one-quarter of an acre, and had a frontage on the Pine Grove Road of one hundred

and eleven feet. The long, two story, frame building which Dr. Phraener erected included under its roof the foundry, a machine shop, a blacksmith shop, and a warehouse.[84] The Quittapahilla Creek which flowed through the property furnished all the water necessary for the operation of the foundry.

The power to operate this foundry was supplied by a twelve-horse-power steam engine. This engine was the first to be used industrially in the Lebanon area.[85] Economically, the successful operation of this steam engine was very important. For, as will be seen later, before very long other industries began to substitute steam power for water power throughout the region. To Dr. Phraener must be given a great deal of credit, therefore, for having begun the revolution in power in this area.

The products of this foundry for the most part were made for the domestic market. They included several types of stoves, including the "Ten Plate Stoves of the handsomest pattern, designed either for Wood or Coal".[86] Also made at the foundry were cellar gates, parts for threshing machines, hollow ware, such as kettles, dutch ovens and pots; plow castings, and gudgeons or pivots.[87]

While there are no records extant to prove the assertion, it may be stated that the foundry was successful, for under Dr. Phreaner and subsequent owners it remained in operation until the twentieth century. In 1847, the editor of the *Courier* wrote that "Dr. Phraener's Foundry is doing a good business".[88] The following year the same editor expressed his satisfaction with some castings he had had made at the foundry, and said, "from the admirable manner in which it was done, we feel bound to recommend the establishment to our readers".[89]

In 1847 Dr. Phraener moved from Lebanon to Franklin County, where he purchased and subsequently operated an iron foundry similar to his foundry in Lebanon.[90] A few years later, in November, 1851, he offered for sale all of his property in Lebanon including the foundry, though he stipulated that if the latter were not sold, it was to be rented on favorable terms.[91] Because he was unable to sell or rent his foundry immediately, Dr. Phraener continued to operate the Lebanon foundry himself until 1854. In April of that year John S. Lash and Alexander Major took over the operation of the Phraener Foundry on a general partnership basis.[92]

The Lebanon Foundry and Machine Shop, the firm name adopted by Lash and Major, advertised for sale a variety of products of their own manufacture, including steam engines, flour mill and saw mill machinery, threshing machines, corn shellers, and many household articles. One of the patented agricultural machines which they had permission to manufacture was the "Railway Horse Power and Over Shot Thresher", for which they claimed the "first premium at the State Fair held at Lancaster". A thirty day trial was offered to all prospective purchasers, and if the farmer was not pleased with its performance, it could be returned. The "two-horse" variety was warranted until it threshed four thousand bushels of grain. Another interesting feature of the management of the new firm was their attempt to expand the market for their products by appealing to readers of the *Courier* other than in the vicinity of Lebanon to give their products a trial.[93]

This partnership remained in operation until the end of the year, during which time it did a "flourishing business", according to the ever-observant editor of the *Lebanon Courier*.[94] On December 30, 1854, the partnership was dissolved by mutual consent, Mr. Lash taking over complete control of the Lebanon Foundry and Machine Shop, while Mr. Major in partnership with his brother William, began the erection of a new foundry on the Pine Grove Road [Seventh Street] north of Mr. Lash's property.[95]

The success of Phraener's Foundry and later the Lebanon Foundry and Machine Shop opened a new era for industry in Lebanon. No longer was steam an untried source of power for the people of Lebanon. No longer could the capitalists of the town doubt the success which would accompany the erection of iron works. As will be seen later, Phraener's foresight and willingness to gamble paid large dividends to the town and county. For Lebanon stood at the threshhold of its most glorious era before the Civil War — the expansion in iron manufacturing in the forties and fifties. The sleepy town was about to awaken, and once awakened would work rapidly to make up for lost time.

NOTES

1. Grittinger, *op. cit.*, III, 5.
2. *Ibid.*, 3.
3. Page 165.
4. The line of ownership as here presented has been taken from Grittinger, *op. cit.*, III, 3-6.
5. Bining, *op. cit.*, 133; *Forges and Furnaces in the Province of Pennsylvania*, 188.
6. Adam Orth, one of Lebanon's outstanding men of the eighteenth century, was born in 1733 and died in 1794. in 1769 he was a commissioner of the County of Lancaster; he took an active part in the French and Indian War and in the Revolutionary War; in 1789 and 1790 he served as a Representative in the General Assembly of Pennsylvania. See the sketch of his life in Egle, *op. cit.*, 289.
7. This testimony cited by Grittinger has been verified to a great extent by the writer through conversations with several of the old-time forge men of Lebanon.
8. *Documents Relating to the Manufacture of Iron in Pennsylvania: New Market Forge.*
9. Grittinger, *op. cit.*, III, 4.
10. *Ibid.*, III, 6; *Record of Court*, 104.
11. *Directory of the Iron and Steel Works of the United States*, 186.
12. Egle, *op. cit.*, 155.
13. Cornwall Furnace, Journal, 1798-1802.
14. *Ibid.*, 1832-1841; 1841-1848.
15. Cornwall Furnace, Day Book, 1782-1785; Recorder of Deeds, Harrisburg, Book K, 578. "Grubbs new iron work, erected this year, at Swatawra Creek, close to the Blue Mountains, 3 hammers, not yet operating."
Hermelin, *Report About the Mines in the United States of America, 1783*, 73.
16. Cornwall Furnace Day Book, 1782-1785.
"Squaring of timber" designated a primitive method which was much used in the colonial period to reduce tree trunks to required shapes and sizes by hewing them with one of two types of cutting tools. The "broad ax" was a tool that had a broad cutting edge parallel with the handle; and the "adz" was also a hand tool that had a narraw curved blade at right angles to the handle. Many timbers so "squared" may still be seen in old buildings in this section. The method was rapidly displaced when water-powered vertical saw mills were built.
17. Union Forge, Time Book, 1783-1795.
18. *Ibid.* Successive entries in this Time Book indicate how rapidly the work progressed:
October 29, 1784—"Finished the Digin of the Race and put in the first anvel Block".
November 12, 1784—"Began at Union to Cutt hammars and fix up the Gears".
November 16, 1784—"the finary hammer was put up".
November 23, 1784—"made the first anconey in the forge".
December 31, 1784—"Draw'd the first Barr iron at Union Forge".
19. Lancaster County Deed Book, Lib. X, Folio 100. The Forge Journals would seem to indicate, however, that the forge was operated by Nathaniel Grubb and Curtis Grubb, jr., sons of Curtis Grubb.
20. Recorder of Deeds, Dauphin County, Book K, 378.
21. Lebanon County Historical Society, *Papers*, II, 338.
22. Weidman Mss. "Title Book". Recorder of Deeds, Dauphin County, Book Q, 209.
John Weidman was the founder of an illustrious family of Lebanon County. He served as an officer in the Continental Line from 1776-1783, retiring from the army with the rank of Captain. For his service to his country during the Revolution he was granted

lands in Northampton County, Pennsylvania. It was this land that he sold in order to purchase Union Forge. Statements of Miss Elizabeth Weidman, Lebanon, Pennsylvania. See also, *Lebanon Courier*, March 13, 1857.

23. Jacob Barge Weidman, known by many as "the father of the Lebanon County bar", was born in 1789 in Philadelphia. He removed to Lebanon County in 1813 and was admitted to the bar of this County at the first meeting of the Courts on December 13, 1813, along with James Buchanan with whom he remained fast friends. In 1838, Mr. Weidman was elected to represent the counties of Dauphin and Lebanon in the Constitutional Convention of that year. He was also an active member of the Mt. Lebanon Lodge, No. 226, A.Y.M., and of the Union Fire Company, Lebanon. He was also a stockholder in the Berks and Dauphin Turnpike Company, and was most active in the civic affairs of his adopted county. In that he was but following the best traditions of Lebanon County iron-masters. See *Lebanon Courier*, March 13, 1857; ms. Subscription Book, Berks and Dauphin Turnpike Company, February 27, 1813.

24. The tradition in the Weidman family as to the causes of the shut-down in 1868 is that the Union Forge Company in that year was forced to build a new mill because of the coming of the Railroad. The cost of this mill was so great that along with the other reverses of the Company the Forge was forced to suspend operations. So far as the Weidman's were concerned, this was the final blow, and their long ownership of the Forge came to an end. (Statement of Miss Elizabeth Weidman, Lebanon.)

25. Cornwall Furnace, Time Book, 1776-1785.

26. The Lebanon and Pine Grove Railroad, as it was then called, was opened on Monday, March 10, 1870. It was later extended from Pine Grove to Tremont and the name changed to the Lebanon and Tremont Railroad. Originally conceived in 1846 as the Lancaster, Lebanon, and Pine Grove Railroad, it was designed to make more accessible the anthracite coal of the Pine Grove area, and to provide a "feeder" for the Pennsylvania Railroad. However, owing to the hesitancy on the part of men of capital to purchase stock in the Company and to the unwillingness on the part of the farmers along the proposed route to sell their land, construction of the road was not undertaken until 1853. Then, with the support of the Philadelphia and Reading Railroad Company, interest in the project was revived. Construction of a road from Pine Grove to Lebanon was undertaken and completed in 1870. The road is approximately forty-two miles in length. *Lebanon Courier*, 1846-1870, *passim*.

27. *Documents Relating to the Manufacture of Iron in Penna.* Union Forge, 1850.
28. Bining, *op. cit.*, 84.
29. Union Forge, Time Book, 1783-1795.
30. Union Forge, Journal, 1783-1787.
31. Union Forge. Pig and Bar Iron, 1784-1795.
32. *Ibid.*
33. Cornwall Furnace, Blast and Pig Iron, 1798-1807.
34. *Ibid.*, 1807-1822.
35. Cornwall Furnace, Blast Book, 1846-1848.
36. Union Forge, Pig and Bar Iron, 1784-1795.
37. *Documents Relating to the Manufacture of Iron in Pennsylvania, Union Forge*, 1850.
38. *Ibid.*
39. Union Forge, Journal, 1783-1787.
40. Cornwall Furnace, Time Book, 1776-1785.
Governor Dick, referred to in this quotation, was a slave owned by Curtis Grubb. He was a collier by trade, and, according to tradition, worked for a long time on a singularly prominent mountain head in the South Mountains near Cornwall. This head bears the name "Governor Dick" today and has become a favorite spot for hikers and picknickers.
41. Union Forge, Time Book, 1783-1795.

42. *Ibid.*, Lists of Employees of the Union Forge showing the variations in numbers of employees.

	1784	—	1785	—	1790	—	1794
Jan.	0		11		10		7
Feb	0		11		11		13
Mar	8		0		10		15
Apr.	8		0		19		15
May	18		15		26		19
June	30		9		27		12
July	27		20		25		11
Aug.	35		18		25		12
Sept.	33		23		25		11
Oct.	29		24		24		8
Nov	25		22		20		8
Dec.	14		15		17		8

Three negroes were listed — Bob, Harre, Gov. Dick.

43. In July, 1790, for example, eleven men were listed as "mowers" and "haymakers". *Ibid.*
44. *Documents Relating to the Manufacture of Iron in Pennsylvania. Union Forge*, 1850.
45. Providing food for the hungry workmen at times proved to cost more than had been anticipated. The clerk at Union Forge in some exasperation wrote in the Time Book in March, 1786; "List of Boarders, an expensive gang."
46. *Ibid.*, 1783-1795.
47. *Ibid.*, 1783-1795.
48. *Ibid.*, 1783-1795. The rate of exchange in 1783 was £1 equalled $2.67.
49. Union Forge, Journal 1789-1792.
50. Colebrook Furnace, Journal, 1791-1797.
51. Lancaster County, Will Book, "O", I, 347-351.
52. Lebanon County, Orphans Court Docket, 1848.
53. Colebrook Furnace, Time Book, 1791-1798. In 1793 a grist mill was erected by Robert Coleman on the Colebrook property.
54. *Alden's Appeal Record*, Coleman v. Brooke, 269.
55. Colebrook Furnace, Journal, 1791-1797.
56. Colebrook Furnace, Time Book, 1791-1798.
57. *Ibid.*
58. Lebanon County Historical Society, *Papers*, III, 7.
59. Colebrook Furnace, Pig Iron, 1792-1796.
60. *Ibid.*, 1799-1808.
61. *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Colebrook Cold-blast Charcoal Furnace.
62. Colebrook Furnace, Pig Iron, 1792-1796.
63. *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Colebrook Cold-blast Charcoal Furnace.
64. Colebrook Furnace, Castings Made, 1824-1837.
65. Colebrook Furnace, Time Book, 1791-1798; *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Colebrook Cold-blast Furnace.
66. Colebrook Furnace, Time Book, 1799-1809.
67. Grittinger Mss. Lebanon County Historical Society.
68. *Documents Relating to the Manufactur of Iron in Pennsylvania*, 1850. Colebrook Cold-blast Charcoal Furnace.
69. Lebanon County Historical Society, *Papers*, III, 33-50.

70. Grittinger Mss. Lebanon County Historical Society. In December, 1856. Clement Brooke sold his half-interest in the Robesonia Furnace to Robeson for the sum of $100,000. The Cornwall ore-right which was attached to this furnace was valued, in 1856, at from twenty to twenty-five thousand dollars annually. *Lebanon Courier*, January 2, 1857.

71. Bining, A. C. *Pennsylvania Iron Manufacturer in the Eighteenth Century*, 192; Cornwall Furnace, Blast and Pig Iron, 1798-1807.

72. The deed was recorded on March 4, 1854. Lebanon County. Recorder of Deeds. Deed Book "L", 774. Between 1838 and 1847, Seidel purchased thirteen additional tracts of land adjoining his original purchase. Most of the latter tracts were woodlands. Deed Books "L" and "M".

73. Lebanon County. Recorder of Deeds. Deed Book "M", 71. The total amount of land purchased by Henry B. Seidel in 1854 was 1467 acres. In 1846 Cornwall Furnace sold pig iron to "J. Seidel & Son", Cornwall Furnace, Blast Book, 1846-1848. In a letter from John H. Lick to the Historical Society of Pennsylvania, June 2, 1845, he states that the "Monroe Iron Works" was the property of Jonathan Seidel and son. Lebanon County Mss. Historical Society of Pennsylvania.

74. John W. Killinger was born in Lebanon County in 1825. In 1846 he was admitted to the Lebanon County bar. From 1850 to 1852 he served in the Pennsylvania House of Representatives, and from 1853 to 1857 in the State Senate. In 1859 he was elected to the United States House of Representatives and served two terms to 1863. He was reelected in 1877, again seerving two trms to 1881. Again, from 1883 to 1887 he was the representative to the House from the local district. It is likely because of his interest in the law and politics that he did not maintain his interest in the operation of Monroe Forge. Lebanon County Historical Society *Papers*, I, 77; II, 368; V, 85.

75. *Ibid*, III, 9.

76. *DocumentsRelating to the Manufacture of Iron in Pennsylvania*, 1850. Monroe Forge.

77. Cornwall Furnace, Journal, 1832-1841.

78. *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Monroe Forge.

79. *Ibid.*

80. Cornwall Furnace, Blast Book, 1846-1848.

81. *Documents Relating to the Manufacture of Iron in Pennsylvania*, 1850. Monroe Cold-blast Charcoal Furnace.

82. See Chapter II, above.

83. Lebanon County Historical Society, *Papers*, I, 348.

84. *Lebanon Courier*, November 7, 1851; August 28, 1857.

85. Lebanon County Historical Society, *Papers*, I, 348; *Lebanon Courier*, February 13, 1857.

86. *Ibid.*, July 22, 1848.

87. *Ibid.*, April 18, 1856; September 2, 1846.

88. *Ibid.*, August 21, 1847.

89. *Ibid.*, July 22, 1848.

90. *Ibid.*, December 25, 1847; March 18, 1848.

91. *Ibid.*, November 7, 1851. At this time the foundry had an assessed valuation of $1850. Borough of Lebanon, Assessment Books, 1849.

92. *Lebanon Courier*, April 14, 1854.

93. *Ibid.*, April 14, 1854.

94. *Ibid.*, November 10, 1854.

95. *Ibid.*, January 12, 1855; February 9, 1855; August 10, 1855.

CHAPTER VII

THE GOLDEN AGE: TWO DECADES OF INDUSTRIAL EXPANSION, 1840-1860

During the first four decades of the nineteenth century industry in general in Lebanon County had experienced only a normal growth and development. As has been noted in a previous chapter, this gradual growth is particularly true of the iron industry. This industry was concerned primarily with the smelting of iron ore, as it had been in colonial times, and remained entirely a charcoal industry, carried on primarily on plantations by individuals or families. The absence of any spectacular growth in other industries is also a factor to be noticed. Economically the region, except for the iron industry, continued to be almost exclusively an agricultural one. Only as the nineteenth century moved toward the midpoint, was industry able to compete more successfully with agriculture for workers and capital. But as will be seen, when once the transformation from an agricultural economy to an industrial economy and from rural industry to urban industry got under way, it proceeded at an astonishingly rapid rate.

The two decades which preceded the Civil War were for Lebanon County amazing decades. It seems, as one scans the newspapers of the period, that it were as though the people of the county had been asleep, economically at least, for a century, and now, upon awakening, were determined to make up for lost time. These were two decades of intense industrial activity, of great population growth, of railroad building, and of the advent of steam power on a large scale.[1] In all of its history from the early settlements to the time of the Civil War, the decades of the eighteen-forties and eighteen-fifties were for the people of Lebanon, Borough and County, "the" grand and glorious decades.

In this ante-bellum industrial development Lebanon to be sure was participating in a transformation characteristic of activities throughout the state, and, indeed, throughout most of the eastern states of the United

States. Technical advances in many forms of industry were being made rapidly; the use of coal as fuel in industry was increasing; population growth, now at a high rate, tended to create a greater domestic market for all goods than ever before; canals and railroads were being pushed to completion; and steam power was fast supplanting water power. The factory system, especially in the textile field, was gaining ground. From all of this industrial and commercial progress — and especially is this true in Pennsylvania — there developed a regional distribution of industry. For Lebanon County, iron was and remained supreme. Not only was it of primary importance in the production of iron ore because of the exploitation of the Cornwall ore hills, but also it fast became, after 1840, an important iron manufacturing region.

The reasons for Lebanon's participation in the expansion of the iron industry are several. Primary consideration must be given, of course, to the fact that the Cornwall ore hills continued to yield increasing amounts of ore that was easily obtained. Of almost equal importance after 1840, when anthracite coal began to supplant charcoal as fuel, was the location of the borough[2] of Lebanon close to the anthracite coal fields of the Lykens Valley to the north. This central location made it possible to bring together these two essential materials at a place where transportation was already available. The Union Canal, completed in 1827, joining Reading and Harrisburg and passing through Lebanon, offered the means of transportating iron products east and west; hence the Lebanon area was a natural location for iron industries. Somewhat later the advantages of this strategic location were strengthened by the building of the Lebanon Valley Railroad from Harrisburg to Reading. The economic effects of this road were not only to be seen in population growth which ultimately brought the boroughs of Lebanon and North Lebanon together, but also in the fact that through increased transportation facilities more capital was attracted to the building of iron works.

This rise of the iron industry in the region of Lebanon, however, was not accomplished without the constant prodding and urging from the editor of the *Courier* and others who were anxious to have Lebanon forge ahead. In 1845 Mr. Worth, the editor of the *Courier*, protests that the citizens of Lebanon were not yet exerting themselves sufficiently in helping the town

to grow. In several strong editorials he urges more and more economic activity on the part of the townspeople. On November 12, he wrote,

> "Our Borough might grow and flourish much more than it has done for the past year, at least, if the inhabitants would put forth their energies for that purpose . . . . If this were done, a different use would be made of property, a far different application would be made of capital, and labor and skill would be more generally and profitably employed. Much labor, capital, property and skill are misapplied, or not fully employed, and thus the value thereof is not rendered properly available for the public benefit . . . . Most men could do more, both for themselves, the community in which they live, and for their country, if they would properly exert the energies of both their bodies and their minds."

A Lancaster correspondent, in similar fashion, wrote, in January, 1846, "The elements of success exist in . . . Lebanon as elsewhere, and a moderate outlay of Capital and enterprise would be rewarded with abundant profits to the operators . . . there is no good reason why Lebanon should not become a manufacturing town . . . Solitary and alone I set this ball in motion."[3] Over a year later this same correspondent again lashes out at the apparent inability or unwillingness of Lebanon to participate in the upsurge of industrial growth.

> "Languishing for years in a sort of dreamy torpor and . . . gorged to the fill with the bitter sweets of apathy and inaction, your worthy citizens have grown insensible to the spirit of Progress abroad in every direction of the country. And now that an impulse has been given in the way of improvement [a projected railroad from Pine Grove to Lancaster by way of Lebanon] there should be one grand union of effort, and every one should feel it a personal concern with them to do his share in building up the town of his nativity and the residence of his choice".[4]

The effects of these spirited outbursts in print is a matter for debate. Certainly there were more potent forces at work which operated to cause men to devote capital and energy to building up industry in Lebanon, but these editorials and letters, perhaps, centered the attention of the citizens on the golden opportunities that were theirs in the forties and thus doubtless hastened the day when manufacturing plants were actually started.

It will be recalled that the Phreaner foundry in Lebanon, established in 1840, was in a sense the "last of the old and the first of the new". That is, it went into operation at the very end of the early period of expansion of the iron industry in the County, and was the first to be established in the town of Lebanon itself. For several years after Dr. Phreaner started his venture into the iron business, there was a period of inactivity in Lebanon. No new iron works were erected or even projected. The reasons for this lag are rather obvious. The country was experiencing difficulty in recovering from the depression years which followed the panic of 1837. Most men of capital were aware of the tremendous possibilities involved in the technological changes which were underway and thus were unwilling to invest in plants using older methods and the customary fuel, charcoal; nor, on the other hand, were they ready as yet to tie up their capital in the newer processes until these processes had been fully proved. In the textile and flour milling industries the same hesitancy is apparent. If in the future steam power proved satisfactory, it would entirely replace, of course, the water power. Then mills and factories need not be located on streams of water, but their locations would be determined by other considerations such as markets, transportation, sources of raw materials, and labor supply. So to the perhaps more than necessarily conservative Pennsylvania-German and others, it seemed better to wait a bit to see just how the new source of power would develop. When it was seen, however, that these technological changes were successful and that steam power had come to stay, new industries were soon established in increasing numbers.

Throughout Lebanon County, but more particularly in the town of Lebanon, more new industries were established in the years immediately preceding the Civil War than were established in the entire century prior to 1840. After the new era of expansion got under way in the forties and up to the time of the panic of 1857, eleven iron furnaces and foundries were constructed and put into operation . The panic, to be sure, did not pass unnoticed in Lebanon. Furnaces, forges, and shops were shut down, men were thrown out of work, and "times became hard". But in the last week of 1857, the *Courier* could still report that "most of our mechanics still have *something* to do", and that industry in Lebanon was busier than in most other towns.[5] When recovery from the panic got underway, in the succeeding decade, eight more were added, or a total of nineteen new iron plants in less than

a quarter of a century. It must be admitted, of course, that this expansion is not to be compared in extent with developments that took place elsewhere in the state for there were other regions in Pennsylvania that developed more rapidly, but for the Lebanon area the impact of this economic expansion was highly important. In addition to these iron manufacturing plants, there was added to the industry of Lebanon about a half dozen steam-operated grist and planing mills.[6]

While some of these furnaces, foundries, and mills will be discussed in some detail later in the chapter, it may be convenient to enumerate them here along with the dates of their beginnings in order to notice the concentration of development they represent. During the decade 1847-1857, in the town of Lebanon, and including North Lebanon, the following iron works were built and placed in operation: the Lebanon Furnaces (also referred to as the North Lebanon Furnaces), 1846-47; the North Lebanon Foundry, 1847; the Dudley Furnace, 1854; Major and Brother, 1855; the Weimer Machine Works, 1856; and the Lebanon Steam Forge and Rolling Mill, 1857.

In the county at large there was also increased activity during this same period in the erection of new iron furnaces and foundries. In 1846 the Annville Iron Company commenced operations; in 1849 the first Cornwall Anthracite Furnace was blown in, while the second stack was erected in 1854; and in 1857, the Millcreek Iron Company was chartered, though it never went into production.

During the years of the Civil War and shortly thereafter, a number of other iron works were erected which may quite properly be included with those listed above, because many of them were projected or planned in the fifties. These works included the Sheridan Furnaces, 1862; the Louser and Son Foundry, 1863; the Lebanon Steam Forge and Pipe Mill, 1864; the Weimer, Meily Company, 1864; the Aurora Iron Company, 1865; the Lebanon Manufacturing Company, 1867; the Lebanon Rolling Mills, 1867; and in the same year the Lebanon Valley Furnace.[7]

From the above listings it will be seen that in the "golden age" of local enterprise in the development of the iron industry in Lebanon County there were five furnaces put into operation, and twelve iron manufacturing plants. In addition to these, several others were planned, but were never built.[8]

This era of expansion in industry was largely occasioned by a number of technological changes already referred to. Important among these changes was the increased use of anthracite coal as fuel in smelting iron ore. The use of charcoal as fuel had made necessary the location of iron furnaces near forests and had encouraged, indeed had required the plantation form of economy. As anthracite coal came to be substituted for charcoal, iron masters were freed from their dependence upon woods and plantations and thus could erect their plants with some regard for markets and labor supply.[9]

Since this replacement of charcoal by anthracite coal and the use of the hot-blast instead of the cold-blast was so very important in developing the iron industry of eastern Pennsylvania and especially in the Lebanon area, some mention should be made of the process and its early development.

Accounts differ somewhat as to the early uses of anthracite in the iron industry. However, it is certain that by the middle of the decade of the eighteen twenties experiments in its use were underway in Pennsylvania.[10] But whatever its beginnings may have been, as a result of independent experiments carried on in the United States and in England, several patents were granted in the thirties for processes that were successful in using anthracite coal.

In 1830, Frederick W. Geissenheimer [Geisenhaimer] was successful in smelting iron ore by using anthracite coal in an experimental furnace in New York City.[11] On December 19, 1833, he received a patent for his process. In this patent he claimed to have discovered the use of anthracite in deoxidating iron ore and in carbonizing iron when reduced, and in adding carbon to bar iron to make steel; and also the smelting of raw ores by the use of anthracite through the use of heated air.[12]

Experimenting independently of Geissenheimer, George Crane used anthracite in smelting iron ore in Wales in 1837. In these experiments he used the hot-blast invention of James B. Neilson, secured in 1828. It was this invention of the hot-blast, replacing the cold-blast used in charcoal furnaces, that made possible the successful use of anthracite coal. The blast was heated directly at the tunnel head by the furnace flame. Later improvements, in 1836, succeeded in raising the temperature of the blast to 500° which in turn increased the output of the furnace about forty percent and saved

an equal amount of fuel. During the decade of the forties hot-blast ovens were built and the gases from the furnace were led to them before igniting. This process saved more fuel and raised the temprature of the blast oven even higher, and was introduced by C. E. Detmold about 1842.[13] Then, too, driving the blast by steam power, which was first done successfully in 1839, a greater volume of blast was secured, as well as a more uniform pressure than was possible by using water power. It also ensured a continuous blast despite droughts and freshets which constantly interfered with the operation of water power.[14]

Following these successful experimental uses of anthracite coal, some atrempts were made in Pennsylvania to use it commercially. But it was not until 1840 that the use of anthracite was proved profitable.[15] On July 4, 1840, a furnace at Catasaqua built for the Lehigh Crane Iron Company made its first cast. "With the erection of this furnace commenced the era of higher and larger furnaces and better blast machinery, with consequent improvements in yield and quality of iron produced."[16] By using anthracite coal the furnace stack was able to withstand a much heavier load of iron ore and fuel and thus helped to make the process a cheaper one, reduced the price of iron, and so stimulated demand for iron products. In this way the industry was given new life, especially in the regions close to the anthracite fields, and Lebanon participated in this development.[17]

So it was that the cumulative and interrelated effects of the use of anthracite coal and the hot-blast, the substitution of steam power for water power, an increased population with a consequent increased demand for goods, and improved transportation facilities, all working together, brought increased industrial activity to Lebanon, and made of the decades of the forties and fifties golden opportunities for labor and capital. While Lebanon continued to be an important iron ore-producing region, it was also to become an important iron-manufacturing region.

The men of capital in Lebanon were finally convinced of the profits to be made in the iron industry when the use of anthracite coal and the hot-blast was definitely proved possible. While the members of the Coleman family maintained their leadership in this new era, other individuals and groups of individuals entered the industrial scene of the city and county.

At the time that the Lebanon Furnaces were being erected, the editor of the *Courier*, in discussing the favorable potentialities of the iron industry, stated,

> "Ten years ago there was not an anthracite furnace in the country; now there are about thirty, producing one hundred thousand tons per annum. Five years ago there was not an iron rail made in this country; we now have about a dozen mills for its manufacture, which produce about one hundred thousand tons annually. Ten years ago not an Iron Boat was seen, and now they are floating on almost all our Water. — What with Iron railing, rafters, shingles, door-frames, and ten thousand other purposes to which it is applied, this Trade must become the mightiest in extent and value, in the land."[18]

These sentiments were not lost on the men of capital in Lebanon. They, too, saw the tremendous possibilities in the future of the iron industry and soon set about to participate in its expansion.

With ill-concealed pride and remembering his long campaign to have Lebanon "wake-up" industrially, Editor Worth announced, as it were, a Christmas present for the people of Lebanon and the surrounding towns on December 24, 1845. He jubiliantly exclaimed in his paper " we are to have, actually and positively, an Anthracite Furnace in our immediate vicinity . . . . already do we fancy the air darkened by a cloud of hats and caps elevated simultaneously by their owners as they lustily shout, Success to the undertaking! . . . fortunately, a change is coming oer the spirit of our people's dreams; and instead of the quiet sleepy aspect which our town has heretofore presented we can now anticipate the noise and bustle which is the universal attendant of active industry and enterprise."[19]

The furnace spoken of was the Lebanon Furnace, built by Robert and George Dawson Coleman, sons of James Coleman and grandsons of the first Robert Coleman of Cornwall. This furnace, the first anthracite hot-blast furnace to be erected in the county, marked the real beginning of the expansion of industry in Lebanon and as such is of fundamental importance to the economic history of the region.

The site of the furnace was on a large tract of land located on the Union Canal one mile northwest of the borough of Lebanon. On this tract was erected, in the spring of 1846, an anthracite furnace and office building.[20] This location was an excellent one. Ore was hauled from Cornwall for a

time by teams on a road that led directly to the ore hills.[21] Later, in 1855, the North Lebanon Railroad was constructed to bring in the ore from Cornwall.[22] Coal was brought to the furnace by boats on the Union Canal, and limestone was abundant throughout the surrounding countryside.[23]

The stack itself was a "bank" stack, built into the side of a hill in order to make the top of the stack level with the floor of the stock house and thus allow the stack to be filled easily and conveniently. The stack was thirty-five feet high, forty feet square at the base and thirty feet square at the top. It had a bosh of fourteen feet and had three tuyeres. It was built of limestone, lined with fire-brick.[24]

The estimated cost of erecting an anthracite hot-blast furnace in 1846 was between fifty-five and sixty thousand dollars, including the site and the necessary machinery. Excluding the grounds, the cost was likely to be in the neighborhood of fifty-thousand dollars, according to an estimate made by Mr. Charles B. Forney in referring to the Lebanon Furnace.[25]

A second and similar stack was erected close to stack number one, and was "blown in" in the spring of 1848. This second furnace had a bosh of twelve feet, but in every other detail was a duplicate of the first.[26] Each of these two furnaces was equipped with a cast iron hot-blast stove, two sets of boilers and a six feet by six feet geared blowing engine.[27]

To the Coleman's, then, must be given considerable credit for having had the courage to lead the way in the development of the iron industry in the middle of the nineteenth century.[28] In 1852 Robert Coleman sold his interest in the Lebanon Furnaces to his brother George Dawson Coleman and, after a brief career in the iron commission business in Philadelphia, left the United States to take up residence in Paris where he died in 1878.[29] George Dawson Coleman, now sole owner of the furnaces, remained in charge of the furnaces until his death on September 9, 1878.[30] During the years of his ownership, G. D. Coleman was to make an indelible impression upon the economic development of Lebanon and upon the life of the community and of the state at large. Locally, he not only was the leader of the iron industry, but he was also a leader in many philanthropic and charitable organizations. During the War Between the States, he personally raised, and to a large extent financially supported, the Ninety-Third Pennsylvania Volun-

teers.[31] For his generosity and continuous interest in this organization he was fondly referred to as the "Father of the Regiment". He financed and supported the Christ Presbyterian Church, located near his Furnaces. He was a well known agriculturalist, specializing in the breeding of horses and cattle. Politically also Mr. Coleman was active in positions of leadership. During and after the War, he served two terms in the Pennsylvania House of Representatives, and three terms in the state Senate. When the State Board of Charities was organized in 1869, Mr. Coleman was appointed a member and remained on the Board until his death, having also served as President of the Board for a number of years. His services as a member of the Sanitary Commission during the War was an indication of the wide-spread recognition of his abilities and sympathies. He was elected in 1876 a trustee of Lafayette College. In 1857 he was elected a director of the Lebanon Valley Railroad. From 1856 until his death he was president of the First National Bank in Lebanon. He had many other interests and served on many other boards, but enough has been cited to show the broad nature of the man and to show why he was of such importance to Lebanon. But despite these many diversified activities, the center of his interest remained in the Lebanon Furnaces.

Upon his death, many resolutions of sympathy and appreciation were passed by local and state organizations. None of them, however, better demonstrate the esteem in which he was held than the resolutions passed at a meeting of the employees of the Lebanon Furnaces on September 12, 1878. In part these resolutions read as follows:

> "Resolved, That in the death of Mr. Coleman we have lost a kind and considerate friend—such a friend as we best know how to appreciate. Many of us look back over a long period of years of service and feel that all during that time our best interest was always the earnest consideration of our late lamented employer.
>
> "Resolved, That we request that these resolutions may be entered in the Office Time Book, where our names appear, as a tribute of our appreciation for the unwavering kindness of a generous employer to his employees."[32]

After his death, the ownership of the Furnaces passed into the hands of his widow, Mrs. Debbie Coleman, and after her death, in 1894, the two sons, B. Dawson, and Edward Coleman operated the furnaces until July, 1901, when they sold out their entire interest to the Pennsylvania Steel Company.[33]

All of the owners of the Lebanon Furnaces were very progressive and far-sighted, and especially was this true of George Dawson Coleman. More will be said later in this chapter concerning his civic and charitable contributions. As an iron master he had few equals. Not only was he the first to use Cornwall ore with anthracite coal on a large scale; he also was constantly experimenting to improve the product of his furnaces or to increase their output. In the words of Editor Worth, Mr. Coleman was willing to "try all things and hold fast to that which is good".[34]

In the year 1856 he began to erect an experimental furnace on the same tract of land on which his two other furnaces stood. In this new furnace he wanted to attempt to use anthracite coal in smelting iron ore by using either a hot-blast or a cold-blast. This method would greatly reduce the cost of making pig iron and hence broaden the market for the product of his furnaces. After several unsuccessful attempts to secure a good run of pig metal from this experimental furnace, Mr. Coleman gave up the experiments and shortly thereafter had this stack torn down.[35] Though this attempt failed, it serves to show the progressive nature of Mr. Coleman.

This progressive nature is also to be seen in the fact that he built the first gas works in the entire Lebanon region. In 1856, in addition to erecting the experimental furnace, he started to use artificial gas to light the furnaces, foundries, offices, and principal homes of the community that grew up around the furnaces.[36] In that year more than one hundred burners were in use, consuming about one thousand cubic feet of gas per day. The plant to produce the gas was erected at a cost of almost three thousand dollars.[37]

Other examples of his thoroughness and modern outlook could be cited but these will doubtless suffice to indicate his nature. Fortunate was the region in which he lived and worked, for the results of his work were far-reaching.

To return to the Lebanon Furnaces themselves; it was with considerable difficulty, however, that the furnaces were first successfully put into operation. None of the anthracite furnaces which were in blast prior to the Lebanon Furnaces had used the rich magnetic ores of Cornwall except Dr. Eckert's "Henry Clay" furnace in Reading; hence there was considerable

difficulty in getting the furnaces started because of this lack of experience in handling Cornwall ore. In the words of Charles B. Forney, manager of the Furnaces, "our first experiences at Lebanon, in 1847, were very difficult; . . . . we blew in in February, and struggled along until August, and then blew out and shoveled out; . . . a couple of weeks after having blown out, we made the second attempt, worked along for four or five days, and chilled up; had the contents of the furnace again to shovel off before we could blow in, ... we worked along in this way at least a year before we got got under successful headway . . . ."[38] These difficulties in the use of Cornwall ore with anthracite coal was caused by charging the furnace with too much ore in proportion to the coal used. When the proportion used was reduced to a burden of twelve to fourteen hundred pounds of ore for every twenty-one hundred of coal, the furnace began to work more efficiently.[39] In the half-century and more which followed, during which years these furnaces remained in operation, they and their successors proved to be of real economic importance to the town of Lebanon and vicinity.

The output of the furnaces varied, of course. Furnace number one was expected to produce from eighty to one hundred tons of pig iron per week, but as early as July, 1848, was producing at the rate of one hundred and twenty tons per week.[40] On an average over a period of fourteen years, to produce one ton of pig iron required 2.47 tons of coal, 1400 pounds of limestone, and 2.24 tons of iron ore. The costs to Mr. Coleman of these materials, again on an average, were three dollars per ton for coal, fifty-five and one-half cents per ton for limestone, and one dollar and forty-eight cents for ore.[41]

In the first ten years of operation, these furnaces produced together an average of 5,238 tons of pig iron per year. During that period of time the highest tonnage made was 7,837, produced in 1854.[42] Most of the iron made was of grades numbers two and three, though smaller amounts of number one and white iron were made also. Number three iron constituted forty-four per cent of the total tonnage produced; thirty-seven per cent was number two iron; ten per cent was white iron, while the remaining nine per cent was number one iron.[43] In 1850, furnace number one, which consistently produced more pig metal than Furnace number two, ranked ninth in total capacity of all the fifty-four anthracite furnaces located in eastern Penn-

sylvania, and it ranked twelfth in actual production for the year.[44] In 1855 in answer to a boast that the furnace of the Crane Iron Company at Allentown had made one hundred and ten tons of iron in seven days, editor Worth countered with a similar boast that such a record was "pretty good, but Lebanon County can beat it. One of the North Lebanon Furnaces of twelve feet size, made 160 tons in seven days. What do you think of that, Messrs. Craneites?" [45]

To do all of the work required around the furnaces and the pipe mill that was erected close to them, 213 men were employed on the average, in addition to one hundred horses, mules and oxen.[46] This addition of more than two hundred wage earners to the lists of workers in Lebanon was of major significance to the economic level of the region. Not only did the wages of these workmen increase greatly the total income of the area, but the servicing trades and artisans were also greatly stimulated.[47] The indirect effects of this addition to the ranks of wage earners were fully as important as the direct effects of the wages. Business increased for tailors, shoemakers, blacksmiths, millers, etc.; in fact the entire population of the valley was given an economic stimulant when this increased population and purchasing power began to operate in the community. No clearer indication of this impetus to industry and trade in Lebanon can perhaps be mentioned than the establishment of two additional banks in Lebanon itself during the decade of the fifties. In 1831, a bank known as the Lebanon Bank had received its charter and commenced doing business.[48] For many years its facilities proved to be sufficient for the people of Lebanon and the surrounding country. But after the industrial revolution got under way in this section and industry began its tremendous development, there arose a need for more financial institutions with additional financial resources. This need was recognized at the time by the editor of the *Courier*. On June 6, 1856, he wrote, "There can be no sincere question in regard to the want of an increase of Banking capital. Our business men have had to look elsewhere for their accomodations frequently. The new institution [The Lebanon Valley Bank] has the desire to place a large capital at the service of the business community and to accomodate [sic.] fully the legitimate wants in this respect". During the preceding month the Lebanon Valley Bank was organized with a capital of $100,000.[49] In 1864 it became a national bank, taking the name of the Valley National Bank. Another bank, the Lebanon Deposit Bank, known as

the First National Bank after 1864, was organized in 1857.[50] In 1864, also, the Lebanon Bank became a national bank and changed its name to the Lebanon National Bank.[51] Thus was filled a need that had been growing in the community for some years.

For G. D. Coleman himself, the operations at the furnaces proved to be quite profitable, though as was the case in many iron works, he too experienced "feast or famine" periods. In the eleven years prior to 1859, the furnaces showed profits in five years and losses in six. Profits totalling $244,770 were made in 1848, 1849, 1853, 1854, and 1856; while losses totalling $67,733 were shown in the other years.[52]

Such profits as these figures indicate enabled Mr. Coleman to adopt a notable labor policy. Relations with his employees up to the time of the Civil War were excellent. There are no records of any strikes or lockouts occurring in this period. In view of subsequent developments in the whole field of labor relations, it may be charged that G. D. Coleman, by his policies, merely continued the paternal system of his grandfather, Robert, at Cornwall. Be that as it may, the resolutions of the workers on the death of Mr. Coleman, cited above, and the long list of contributions to the welfare of his workers made by him testify to his sincerity of purpose. Not only were the workers housed in homes provided by him, but he also erected a school at his own expense for the children of his employees. The teachers were paid by the owner of the furnaces and books were given to the pupils without charge.[53] A fine large library of "choice and instructive" books was established for the use and benefit of the workers and their families.[54] A Sunday School with an enrollment of about one hundred was held under the supervision of Mrs. Coleman. Each Fourth of July Mr. and Mrs. Coleman provided for a picnic for this Sunday School, a celebration which was usually concluded by a display of fire works in the grounds surrounding their home. While some in the twentieth century may be inclined to scoff at such activities on the part of furnace owners there is no doubt that in the middle years of the nineteenth century such actions were accepted in the same spirit in which they were offered. This feeling is adquately stated in a letter to the editor of the *Courier* written by one who attended a celebration of this kind in 1857. He wrote, "The enjoyments of the Lebanon Furnaces' scholars did not close with the day, but were crowned in the evening by a

handsome display of fireworks" lasting three hours, and which were observed by a crowd of people, old and young. All who were present, he said, owed the Coleman's much, not only for the fire works, but also "for the permanent fires at the foot of the hill".[55] On one occasion, at least, Mr. Coleman's regard for his workers took an even more practical course. In November, 1867, despite the ill-effects of the panic of that year, one of the furnaces was blown in. Mr. Worth credits Coleman with the motive of "affording employment to workmen [rather] than with an expectation of being able to sell iron at compensatory prices".[56] The losses of over three thousand dollars and over eleven thousand dollars at the Furnaces in 1857 and 1858, respectively, support this statement.

Lest it be thought that Mr. Coleman always had the Midas touch, it should be mentioned that his efforts in at least one direction ended in failure. Late in the year 1848 G. Dawson Coleman and Robert Coleman began to erect a pipe foundry close to their furnace. By the summer of the following year this foundry was completed and began to turn out pipe of several descriptions. The foundry continued in operation until the time of the Civil War, and then it was closed down and subsequently abandoned. No attempts were made later to do anything at the North Lebanon Furnaces other than smelting iron.[57]

With the successful establishment, then, of the Furnaces, a real beginning was made in bringing the industrial revolution to Lebanon. Their success in this is amply attested to by the rapidity with which other iron industries were established. Without exception they all used steam power and all used anthracite coal for fuel. The old era was fast passing and with it an old way of life. Citizens might complain, as they did in letters to the editor, of the noise and hustle occasioned by these industries, they might wish for a return to a time when the borough was not so crowded.[58] But they complained and wished in vain. The noise of steam engines and locomotives, of power driven mills and looms, the influx of "strangers", the conveniences and dirt of the railroads, all served to prove that Lebanon entered its "golden age" of industrial development, headed by the Lebanon Furnaces and G. Dawson Coleman. In the words of the oft-quoted editor of the *Courier* "For years past Lebanon had the reputation of being a finished town. She, however, has gone into her second childhood".[59]

When the success of the Lebanon Furnaces seemed assured, it was not long before other men of capital decided that there were fine prospects for profits to be made in the operation of the new anthracite furnaces. As early as November, 1848, the building of a new anthracite furnace in Lebanon County was announced.[60] The erection of this furnace, the Cornwall Anthracite Furnace, number one, was begun in 1849 by Robert W. and William Coleman, who were sons of Thomas Burn Coleman, and cousins of G. Dawson and Robert Coleman of the Lebanon Furnaces and who had only recently come into the possession of the estate of Thomas B. Coleman, valued at almost one million dollars.[61] Construction of this furnace was completed in the spring of 1851, and on June 10 of that year R. W. Coleman was able to record "A remarkable day in the History of Cornwall, Anthracite Furnace blown in . . . Blast put on Anthracite at 6½ o'clock A.M.".[62] This furnace worked well from the start and encouraged the owners to erect stack number two in 1854.[63] The plans for the construction of this stack were copied from those used in building the first stack at the Lebanon Furnaces. These stacks at Cornwall were built of red brick, lined with sand stone and fire brick. All of the other buildings needed in the operations of the furnaces were also built of bricks. Both stacks were built into the side of a hill and were bound with two inch iron bands. They were thirty-five feet high, forty feet square at the base and thirty feet square at the top. Each stack had three tuyeres and one fore-arch, a bosh of fourteen feet and a crucible of five and one-half feet. Both used steam power for the blast and both used anthracite coal for fuel, and both used Cornwall ore. Each had a hot-blast stove, a single cylinder boiler and a vertical blowing engine.[64] The boilers and heaters were of the same length, thirty-eight feet, and were connected by five pipes twelve inches in diameter.[65]

William Coleman died in May, 1861,[66] and Robert W. Coleman in 1864 at which time the name of the company operating the furnaces was changed from R. W. Coleman to R. W. Coleman Heirs and Company. The firm was then composed of the sisters of Robert W. Coleman, Anne C. Alden, Margaret C. Freeman, and Sarah H. Coleman, and also two minor children of William Coleman, Robert H. and Annie C. In 1882 Robert H. Coleman bought out the shares of all the others and operated the furnaces himself until 1894 when they were sold to the Lackawanna Iron and Steel Company. In 1898 this company closed down the furnaces and dismantled them.[67]

These furnaces produced pig iron primarily, though from time to time some castings were made for the local trade. The production records of these furnaces are slightly better than those of the Lebanon Furnaces. During the first few weeks of operation stack number one was producing between eighty and one hundred tons of pig iron per week.[68] In 1856 stack number two averaged over one hundred and thirty tons per week.[69] Mr. Artemus Wilhelm, manager of the furnaces from 1857 until 1882, testified in 1859 that over an eight year period, June 1851 to March 31, 1859, the furnaces together averaged more than 5700 tons per year for a total production of 45,703 tons. To produce a ton of pig iron there was required an average of 2.02 tons of ore, 2.02 tons of coal, and 1500 pounds of limestone.[70]

Much of the iron that was made was sold through agencies in Philadelphia and New York. The iron was transported by teams, later by the trains of the North Lebanon Railroad to the landings on the Union Canal and later to the Lebanon Valley Railroad and from those points shipped to either of the agents. Cabeen and Company in Philadelphia, or to Henry G. Nichols in New York, though for a period of about one year in 1851-1852, Colwell and Company acted as the Philadelphia agent. These agencies received five per cent of their sales as their commission, with the stipulation, however, that "all home sales to different places as Pottsville, Reading, Harrisburg, Duncannon, etc. we reserve to make ourselves".[71] Cabeen and Company proved to be very satisfactory agents. In 1854 more than two thousand tons of pig iron of number one and number two grades were sold by them, and in 1855 almost thirty-five hundred tons were disposed of by this agency.[72]

The remainder of the output of these furnaces was sold by the Colemans to forges and mills in the nearby markets or was used in other enterprises owned by themselves. For example, they supplied pig iron on order not only to local forges around the Cornwall area, but also to such iron works as Isabella Forge in Chester County and to the firm of Snyder and Milner in Pottsville.[73]

In the Time Books kept at the Furnaces, all of the employees are listed together. That is, the names of the workers include not only the furnace workers, but also domestic servants and farm hands. Including these, the workers numbered about sixty in 1855 and as many as one hundred in 1860.[74]

As in the case of the Lebanon Furnaces, the Cornwall Anthracite Furnaces

gave additional evidence that iron was to be "king" in Lebanon County for many decades. Their success with the use of steam power and anthracite coal gave an impetus to the development of the county industrially and helped in creating a favorable atmosphere for the erection of more iron works.

One other furnace was "blown in" in the county before the Civil War. In 1853, a company of men including Simeon Guilford, John Krause, Levi Kline, John Weidman, and Jefferson Shirk organized the Dudley Iron Company. This company purchased a tract of land on which to erect their furnace west of the borough of Lebanon adjoining the tracks of the North Lebanon Railroad, which, it will be remembered, was completed the following year. They also purchased some land near Newmanstown on which was found some iron ore which they planned to mix with Cornwall ore in operating the furnace.[75]

The name Dudley for their furnace was selected to honor the English iron-master who was one of the pioneers in the use of anthracite coal in the smelting of iron ore.[76] Simeon Guilford, a civil engineer by profession, who had been employed by the Union Canal for a number of years, drew the plans for the Dudley Furnace. He used the Brooks furnace at Birdsboro as a model.[77] The stack and other necessary buildings were built of limestone. The stack was thirty-five feet high, with one tymp and three tuyere arches. The bosh measured thirteen feet and the crucible five feet. The 130 horse-power blowing engine, which was made by Lewis Kirk in Reading, was operated by steam and was of the horizontal type with a double cylinder and central crank shaft. One stove provided the heat for the blast.[78] Originally the furnace was charged with ore, limestone and anthracite coal by means of an inclined plane which brought these materials from the stockhouse to the tunnel-head of the stack.

On Tuesday, April 3, 1855, this furnace was put in blast. The ceremony of blowing in was described in the following fashion by one who was in attendance.

> "A party of ladies and gentlemen from the borough appeared at the entrance of the casting house at about ten o'clock, [P.M.] . . . . Miss Mary Guilford had been selected to perform the essential part of the ceremony, that of applying the torch. The young lady was led to the mouth of the Furnace . . . and lighting, by friction upon the hearth, a Vesta match, she applied it to a torch . . . and this last communicated to the fuel beneath, soon set the furnace 'in a roar'.

> As soon as the blaze illuminated the dark vaulted roof of the casting house, three cheers were given for the success of the enterprize."[79]

Unfortunately for the owners of the Dudley Furnace, and the manager, Jefferson Shirk, who made a fine start in producing upwards of one hundred tons of pig iron per week, difficulties were soon encountered which caused rather frequent "blow-outs".[80]

These disappointing results discouraged the owners of the furnace, and so in April, 1857, it was sold to Robert W. Coleman of Cornwall for the sum of $85,000.[81] During the time that the furnace was operated by this company of men, a period of two years, it had produced 6705 tons of pig iron, requiring 16,329 tons of ore, or an average of 2.43 tons of ore to one ton of metal.[82]

When R. W. Coleman added this furnace to his interests in the iron industry, he immediately changed its name to Donaghmore, brought in Col. D. S. Hammond from Cornwall as manager, and began to make some changes in the stack.[83] He put in a round hearth instead of the original square one, increased the volume of the blast, but above all, changed the method of filling the stack. Instead of using the inclined plane to fill, filling-barrows were used in order to distribute the ore, coal, and limestone more evenly through the stack. In this way was avoided the formation in the center of the furnace of the cone which previously had prevented the blast and gas from diffusing properly.[84]

These changes produced an immediate effect so that the furnace began to produce with fewer interruptions, and no major changes were required until 1873. From the time it was taken over by Coleman in 1851 until December 31, 1859, the Donaghmore Furnace produced 8701 tons of pig iron, and when in blast made as high as 125 tons per week.[85] On an average, during these months, there was required to make one ton of pig iron, 1.5 tons of anthracite, 2.04 tons of ore, and 1400 pounds of limestone.[86]

During the years of the Civil War, operations at Donoghmore remained at a high level. Beginning in 1859 a remarkable record was set in keeping the furnace in blast for a period of more than four years, during which time the furnace averaged more than one hundred and nineteen tons of pig iron per week.[87]

After the death of R. W. Coleman in 1864, the furnace was operated by Mr. Artemus Wilhelm, the attorney for R. W. Coleman Heirs, for a period of eighteen years. In 1882, Anne C. Alden, Margaret C. Freeman, and Sarah H. Coleman purchased the furnace and operated it for four years. In 1886 the Cornwall Iron Company took title to it and kept it in blast for four more years, when, in 1890, the furnace was blown out for the last time and was gradually torn down.[88]

The significance of this furnace to an economic history of the county is to emphasize once more the importance of the Coleman family to Lebanon. While it is also important that the erection of this furnace marks an attempt on the part of men not connected with the Coleman's to enter the business of smelting iron, it is noteworthy that their attempts failed, and a Coleman took over their interests and operated the furnace successfully.[89] Lacking sufficient capital and technical knowledge, both of which the Coleman family had in abundance, they gave up operating their furnace after only two years' trial. Hence up to the time of the Civil War, except for the brief career of Seidel's Monroe Furnace, previously referred to, iron smelting in Lebanon County remained exclusively in the hands of the Colemans. Other men of capital, however, did greatly stimulate the industrial growth of Lebanon in other ways, primarily in the manufacturing of iron products.

In the history of the development of iron manufacturing industries in Lebanon County, in contrast to iron ore and pig-iron production it is important first of all to notice that except for a few old-time forges and the shortlived pipe mill at North Lebanon, the Coleman family is conspicuously absent and that other men and families enter the industrial picture. There are several reasons for this contrasting development. The Coleman's owned the ore hills, a fact which gave them an initial advantage over anyone else who attempted to make pig iron. Then, too, they had technical skills which had been accumulated over several generations, difficult to explain fully, but they "knew" iron ore and how to handle it. They had ample financial resources to erect furnaces and keep them up-todate, resources which no other family had. On the other hand, not as much capital was required to erect steam forges or machine shops, and these latter also required technical skills and knowledge which were not monopolized by the Colemans. Hence in the

fabrication of iron products it will be noticed that, while it is still largely local capital that is invested and local men who managed them, names such as Meily, Weimer, Major, Killinger, Seidel, etc., become increasingly important in Lebanon in the years before the Civil War. Also to be noticed in this development is the fact that most of the industries were located in or near the town of Lebanon itself. Only the Annville Foundry, the Cornwall Anthracite Furnaces, and the Sheridan Furnaces were erected elsewhere in the county. Much of this intensified development in Lebanon is to be attributed to the Union Canal, the North Lebanon Railroad, and, later the Lebanon Valley Railroad. In brief, Lebanon's strategic location with respect to transportation and raw materials made of the town an important iron center.[90]

Of the several important iron manufacturing plants that were erected prior to and during the Civil War, the one which developed most rapidly and contributed most to make Lebanon an "iron city" was the Weimer Machine Works, or as it was originally called, "The Lebanon Valley Industrial Works" It was the first plant of its kind in Lebanon County and quickly assumed a very important place in the iron industry of the state, for its products were known throughout Pennsylvania and later throughout the entire country.

On January 1, 1856, William Weimer of Reading, and two of his sons, Peter L., and Lucien E., entered into a brief partnership with John S. Lash to operate the old Phraener Foundry.[91] P. L. Weimer had already secured several patents for improvements on existing furnace and forge equipment, especially for trip and tilt hammers, and these plus many other machines were turned out by them. In addition to the Machine Works, a small iron and brass foundry was operated.[92] The arrival of the Weimer family is one of the early indications that in this period outside capital was being attracted to Lebanon.

The Phreaner Foundry soon proved to be too small and so in the fall of 1856 the Weimers bought a tract of three and one half acres of land along the tracks of the Lebanon Valley Railroad, just opposite the passenger station, for the sum of $6,000.[93] On this tract they began to erect immediately a machine shop, a foundry; and plans were laid to do not only a general machine shop business, but also to manufacture railroad cars and steam engines. The machine shop was a large, well-lighted building, and was ventilated by a fan twelve feet in diameter. The engine room housed an engine designd especially by P. L. Weimer. It was an upright oscillating engine of twenty-five horse-

power, and was the first complete engine made in Lebanon. The foundry was located next to the machine shop. One hundred and forty-six feet long with two cupolas it had a capacity of melting seven tons of iron per hour, a capacity which was excelled by only a few foundries in the country. This capacity enabled the Weimers to make castings up to twenty-two tons in weight.[94] There were erected in addition a boiler shop, a pattern shop, a smith shop, and an office building.[95]

On January 1, 1857, the Weimers opened business at their new location and were ready to make, according to their advertisements, steam engines from one to three-hundred horse-power, machinery for anthracite furnaces, forge hammers, rolling mill machinery, mining machinery, laths, drill presses, valves, boilers, and fittings of all descriptions. "Our boiler sheets are all tested by dividing them into squares of two inches, and hammering each square; any imperfection is thus detected, and the faulty sheet rejected; this is practiced in very few shops in this country" was one of the claims made by the Weimers in soliciting business from the industries of Lebanon Valley. In addition to the regular employees at the Works, a "gang" of boiler Makers was always available to make repairs.[96]

The effect on the industrial tempo of Lebanon was seen immediately and commented upon by T. T. Worth. "Our Borough is fortunate", he wrote, "when such men determine to make this their place of business."[97] This estimate is borne out by the fact that upwards of two hundred men were employed when the works were going "full blast". Thus was added to the population of the town many families from other areas since the town of Lebanon itself could not supply all of the skilled workers that these works required, and thus was added also many potential consumers of other goods and services which stimulated and increased the economy of the town and county.[98]

Much of the success of the Weimer Machine Works, and hence a direct cause for the reputation achieved by the Lebanon area in iron manufacturing, can be traced to the inventive genius of Peter L. Weimer. He was especially gifted in devising improvements for the operation of steam engines. His "Patent Blowing Engine" was famous throughout the country for many years. Another of his patents, the "Patent Cut-Off Governor Valve", which was invented in 1857, also became very popular and was used by a large number of operators of steam engines. It was guaranteed to give to the engine a

regular speed and thus save fuel. Mr. L. R. Hynicka, General Superintendent of the Union Canal Company, testified to the effectiveness of this governor in 1864. "The average daily consumption of coal at the Pond Engine for the year 1864", he wrote to Mr. Weimer, "was 4 tons and 19 cwt. By the application of your improved cut-off, and the introduction of metal packing last spring, the consumption has been reduced to 3 tons and 11 cwt."[99] The charcoal furnace at Cornwall was also equipped with the Cut-Off Valve in 1861.[100]

Another of his inventions which resulted in considerable business for his machine shop and added to the prestige of Lebanon was the development of a small engine designed specifically to operate printing presses. It was a vertical engine of from two and one-half to three horse-power, and was only five feet high. Steam could be raised in thirty minutes and it proved to be very economical in the use of coal. The engine sold for the price of three hundred dollars. After giving it a thorough trial Editor Worth was very enthusiastic over the results, and recommended it to other printers.[101]

It is not necessary to describe all of the inventions made by Mr. Weimer, for they involved such items as a machine to count the revolutions of a wheel, a machine to coil metal rope, several types of safes and locks.[102] He also developed improvements for the existing machinery in his shops, which permitted him, in 1863, to build a steam engine of one-thousand horse-power for the Phoenixville Iron Works, one of the largest engines made in this country up to that time.[103]

Perhaps his most notable invention, and one that proved to be the most helpful in the Civil War, was a new type of shell to be used against the earthen works of the Confederates. It was a cone-shaped projectile which was exploded by means of either a cap or a fuse; hence it could be made to explode either when it struck an object or after it was embedded. To make this shell, new machinery had to be designed and built, and Weimer succeeded in developing both in 1862, with a tremendous saving of both labor and money.[104]

In addition to producing these shells, the Works were busily engaged during the war years in making cannon of the twelve-pounder type. In fact, most of the energies of the Weimers from 1861-1865 were given over to the

war effort. Almost all of their machinery had to be changed, and the employees had to be taught new skills. To Weimer's credit, most of the machinery was changed in about three weeks time in the spring of 1861. These changes meant, of course, that for the period of the war the regular boiler and machinery business in which the plant had been engaged, suffered greatly.[105] The cannon, which were completed at the rate of ten per week, were known as "bull dogs", and were designed "to do immense execution on the seceshers".[106] More than five hundred of these cannon were produced at Weimers' before the close of the war, and, in addition, gun lathes were made for the Scott Foundry in Reading.[107]

In the spring of 1864 and in company with John Meily of Lebanon, the Weimers organized the Meily, Weimer Company for the purpose of manufacturing railroad cars. Several buildings were erected for this purpose on a tract of land adjoining the Weimer Machine Works. About one hundred men were employed in this plant and they turned out as many as twenty-five cars per week; each selling for about one thousand dollars.[108] This car manufactory provides another example of the cumulative effect of the industrial progress being made in Lebanon, because of the number of the men employed and the increased demand for iron from the furnaces of this section.[109]

The story of the other industries that were established in Lebanon County during the two decades of rapid expansion can be told briefly. Important though they were, they were not of equal significance with the industries described above.

In 1862 stack number one of the Sheridan Furnaces was erected by William Kaufman and Frederick Hunter of Reading. This furnace, located at Missimer's Station, now Sheridan, close to the tracks of the Lebanon Valley Railroad, was blown in on August 10, 1863, as a charcoal furnace. The erection of this furnace offers another example of the increased attraction to outside capital offered by the iron industry of Lebanon County. In 1867 it was completely rebuilt as an anthracite furnace. In 1874, stack number two was erected. These furnaces had a combined capacity of about 18,000 tons of pig iron per year and employed about eighty men when in blast.[110]

Still another furnace was projected during the period under study, the Lebanon Valley Furnace. In 1864 several local men, John Meily, Henry J.

Meily, Richard J. Meily and Lyman Nutting, operating under the firm name of Meily and Company, purchased land at the west end of Lebanon to erect their furnace. It was not blown in, however, until December 1867. This stack was thirty-six feet high and had a bosh of twelve feet. It continued in operation until well into the twentieth century.[111]

In addition to these furnaces, several forges and foundries were erected in the forties and fifties, lending additional weight to the evidence presented heretofore that these decades were the time of great expansion for Lebanon.

About 1845 a small foundry was established in Annville by G. A. Walker. This foundry made all sorts of castings, especially stoves and plows. It was a steam-operated foundry and was engaged primarily in local trade. After remaining in operation for more than a decade, during which time it was owned by several different men, it apparently was abandoned, for no further references to it have been found after the year 1854. The last recorded owner of this foundry was John Shertzer.[112]

Another of these smaller plants to be organized and placed in operation was the North Lebanon Foundry, later known as the Forster and Mutch Foundry. This foundry was erected in 1847 by John Thomas, John Shay and Cyrus Mutch, all local men, on a tract of land located at what is now Eighth and Water Streets. A general foundry business was carried on, with especial attention given to the making of stoves, hollow-ware, wagon-boxes, plows, and agricultural machinery.[113] Shay soon sold out his interest in the firm and the business was carried on by Thomas and Mutch until 1851 when Thomas sold out his half-interest to Thomas Forster. The new firm of Forster and Mutch continued to operate the foundry until 1866 when Mutch sold out his half-interest to Forster for the sum of $6,000.[114] Later, this foundry changed hands several more times until finally in 1882 it was bought by the Lebanon Stove Works Company who operated it successfully for many years.[115]

The firm of Alex. Major and Brother, reference to which has been made previously, had established a foundry in 1855 on the east side of Seventh Street near the Quittapahilla Creek, after the firm of Lash and Major was dissolved. This new foundry operated under the name of "Farmer's and Mechanic's Foundry and Machine Shop" and specialized in the making of

agricultural implements.[116] The foundry became especially well known for its threshing machines and made a standing offer to sell their machine on thirty days' trial with a guarantee of one year. This machine won a prize at the State Fair in October, 1855, a fact which gave the Majors and Lebanon considerable prestige for a time.[117] A repair business of fairly large proportions and an agricultural ware-house were also maintained.[118]

In 1864 the foundry was sold to A. M. Zug and Brother of Heidelberg township. Zug developed and popularized the "Keystone" line of reapers and mowers, and operated the foundry until December, 1865.[119] The Keystone reaper had several advantages over most of the other reapers then being manufactured. "It will throw the Cutting Bar over stumps and rocks by pulling the lever, and has gum springs, so as to suffer no damages by coming in contact with stumps and rocks. The Platform can be laid on the Carriage or Reaper so as to occupy no more room than an ordinary wagon."[120] In 1865 the foundry was sold to the firm of Painter and Embich of Myerstown for the sum of $4,000, while the Machine Shop and water rights to the Quittapahilla Creek were sold to Abraham Strickler for $5,000. Strickler immediately began the erection of a large three story flour mill on the site.[121]

In an attempt to take advantage of the excellent prospects for the iron business during the Civil War, a small foundry was erected in 1863 by Michael Louser and Son on a tract of land located on Cumberland Street at what is now Twelfth Street. Light foundry work of all kinds was attempted. This foundry was short-lived, however, and shortly after the close of the Civil War it was abandoned and sold to William B. Reinhard who established a stone crushing business on the site.[122]

The failure of Louser and Son to operate successfully was an unusual experience for those engaged in the iron industry in Lebanon during this period. It is likely that the failure was occasioned both by a lack of capital to "ride out" the period of dull times following the Civil War, and by the fact that the small general foundry was finding it increasingly difficult to compete with the larger, more modern iron plants then being established throughout the country.

A much more successful enterprise was the Lebanon Steam Forge. It was erected in 1857 by John B. Seidel, Henry B. Seidel and Philip W. Killinger on a tract of one and one-half acres of land located on Cumberland Street

near the North Lebanon Railroad tracks.[123] In addition to the steam forge a rolling mill was also planned, but this ambition was not fulfilled until well after the Civil War period. The original plant included six heating fires, shears, and a trip hammer, all operated by two steam engines built by Weimer's.[124] Charcoal pig iron was used primarily by this forge, with practically all of their supplies of pig metal coming from the Cornwall furnace.[125] In 1861 orders began to come in from England, a market that had not been exploited hitherto by Lebanon plants and for which the forge received due praise from the local press.[126] The Seidels and Killinger operated this forge until February, 1863, then sold it to David Mitchell of Baltimore for the sum of $13,000.[127] From 1863 until 1884 the forge underwent several changes of ownership and also expanded its operations to include a rolling mill in 1872 which had been part of the plan of the original owners. In 1884 it was taken over by the West End Rolling Mill Company and enjoyed many years of successful operation.

Finally, mention should be made of two additional iron works which, though they were established after the Civil War, were projected and planned within the time limits of this study. Both of them were of extreme importance, industrially, to Lebanon in the post-war years.

In 1865 the Aurora Iron Company was chartered, and commenced operations in November of that year. The owners of this company included several men who for many years were interested in the manufacture of iron products. Artemus Wilhelm of Cornwall, D. S. Hammond, William Shirk, A. R. Boughter, and Peter L. Weimer were the original owners of the plant erected on Fourth Street near the tracks of the Lebanon Valley Railroad.[128] Despite ample capital and experienced leadership, this venture into pipe-making failed, and upon reorganization in 1882 as the Lebanon Iron Company, a rolling mill was constructed. This company was finally taken over by the American Iron and Steel Company in 1899.[129]

The other iron industry-and one that was very successful — to be established in the period immediately following the Civil War was the Lebanon Manufacturing Company. Twenty residents of Lebanon, including some men who were financially interested in other industries, formed this company in 1867. They were "desirous of increasing or adding to the business facilities of our county, thereby creating a spirit of improvement, (or assisting

thereto) the want of which has ever been felt in our community".[130] We may assume that they also hoped to turn a nice profit from the business!

Shortly after commencing operations, the building of freight cars was undertaken. In this venture the company was immensely successful. Opportunity for employment in these shops increased constantly. From a working force of one hundred men at the outset, the company increased its business by the end of the century to a point where more than five hundred men were employed.[131]

It will thus be seen that in the decades of the eighteen forties and eighteen fifties Lebanon underwent economic and technical changes that were to result in its becoming an industrial town of some importance. No longer, after these decades had come and gone, did it rely primarily upon agriculture and agricultural products. These changes were determined for the most part by its favorable location with respect to ore and coal deposits lying nearby, by its improved transportation facilities, and by the progressive nature of the Coleman family. Only they had the necessary capital resources and initiative to go ahead. Only they had the courage to attempt to smelt Cornwall ore with anthracite for the first time commercially and hence permit this region to participate in the general economic advance made by the iron industry before the Civil War. In successfully leading the way to these changes they led and encouraged others to enter the machine shop and rolling mills phase of this industry, which in turn developed a need for more furnaces.

These decades were also to establish Lebanon definitely as an iron town. The factory system in textiles was well established elsewhere, but for the rest of the nineteenth century, iron was to be Lebanon's chief concern.

Local capital, for the most part, provided the means for establishing and developing the iron industries. However, in the case of the owners of the Weimer Machine works and the owners of the Sheridan Furnaces there are evidences of the attractiveness of the region to outside capitalists. This was a trend which would become dominant by the last decade of the century when almost all of the Coleman interests and many of the other local industrialists sold out their plants to the large steel companies then forming.

Population growth offers another proof of the importance of the iron industry of Lebanon. Doubtless the town and county would have participated

in the increase of population which was being experienced country-wide, but certainly the furnaces, foundries, forges and machine shops attracted many persons and families to Lebanon. Naturally this reliance upon iron implied economic disadvantages as well as the obvious advantages. When furnaces and mills were shut down and men were thrown out of employment the monopolistic position of the iron industry was a real disadvantage. Had other industries been developed to parallel the development of the iron industries, the shock of unemployment could have been absorbed somewhat, but as it was, a depression in iron was a difficult period in Lebanon. "Lebanon is certainly dull", wrote editor Worth in 1865, "decidedly, wretchedly, discouragingly dull . . . . . The few years preceding the financial troubles of '57 proved that Lebanon could be made to grow and that rapidly. It was, in those years, the most flourishing among interior towns . . . . But our prosperity went down with the rest of the country, and instead of recovering therefrom as other places did, we have continued in comparative inactivity, as if we had not realized the fact that the crisis had passed, and that a new day had dawned upon us."[132]

In general, though, through the decades of the nineteenth century employment remained fairly constant, and profits consistently high enough to maintain operations. The twentieth century witnessed a considerable change in the nature of the economy of Lebanon, but for the nineteenth century iron was king, and Lebanon was truly an "iron town".

1. The intense interest shown by the people of Lebanon is to be seen in the references made in the local press to citizens who were making small engines experimentally. See, for example, an account of a small engine made by the young son of one Henry B. Oves. This engine had a stroke of eight and one half inches, a boiler over four foot long and was calculated to have one horse-power. *Lebanon Courier*, March 26, 1851.
2. Two settlements composed the city that is now Lebanon: the borough of Lebanon erected in 1821, and the borough of North Lebanon, erected in 1855. These two boroughs developed side by side until 1868 when they united. For convenience in this chapter, and since in their economic development they went ahead together, they have both been included in the term "Lebanon".
3. *Lebanon Courier*, Letter from Lancaster Correspondent, January 7, 1846.
4. *Ibid.*, February 11, 1846.
5. *Ibid.*, December 25, 1857; see also October 16, 1857, and October 2, 1857. In the latter issue the editor advances his reasons for the financial troubles then in evidence. "But things must come down. We had got on entirely 'too high a horse'. We were living too fast. Our expenditures have got to be curtailed. We must wear cheaper clothes, build less costly houses, indulge in cheaper furniture, and spend less in every way. The necessaries of life will have to be cheapened. Produce will come down . . . . We have got to take a fresh start . . . . Economy and care will bring all things right."

6. The substitution of steam power for water power in the milling industry of the region followed rather closely in point of time the change in power as inaugurated by the iron industry. Influenced no doubt by the successful use of steam power at the Lebanon Furnaces, Messrs. Myers and Beckley introduced steam power into their grist mill in 1848. This mill was located several blocks east of the Furnaces. They also installed a steam engine in their grist mill in Myerstown in that year. The following year a group of men in Campbelltown built a grist mill and operated it by a steam engine. In 1850 David Boyer in North Lebanon and Solomon Kline in North Annville Township built steam-operated Mills, and in 1855 Messrs. Gockley and Law started to grind grain by steam power in their mill two miles east of the Borough of Lebanon. In 1858 Stricklers Mill in the Borough of Lebanon began to use steam power instead of the waters of the Quittapahilla to make flour. Thus in the decade prior to the Civil War, the milling industry further supports the validity of the thesis of this chapter. A revolution in idustry was underway and in that revolution the milling industry participated. *Lebanon Courier*, March 25, 1848; July 22, 1848; December 23, 1848; September 1, 1849; May 10, 1850; June 27, 1851; March 16, 1855; October 2, 1857; September 10, 1858.
7. The Coleman interests in the decades of the seventies and eighties erected three more furnaces, Bird Coleman, 1872-1873; North Cornwall Furnace, 1872-1873; and Colebrook Furnace, 1880-1881, but these furnaces lie altogether outside our field of inquiry.
8. In at least one instance the mania for investing in shares of oil companies seems to have caused difficulties to a group of local men who were attempting to raise $250,000 to erect an iron works. *Lebanon Courier*, 1865; *passim*.
9. Shannon in his *Amerita's Economic Growth* p. 19, advances an interesting theory with respct to the Walker Tariff of 1846 and its effect on the iron industry. Because of the low tariff rates imposed under that act, he says, many ironmasters had to change their methods in order to stay in business, and he believes that from then on the industry began to make headway. The reduction in price of iron and iron products which these changes brought about stimimulated our entire economic growth.
10. Clark, Victor S., *History of Manufactures in the United States*, I 412, citing *Niles Register*, XXIX, 262, gives the year 1825 as the date when anthracite coal was used in the smelting of iron ore in Pennsylvania. Pearse, John B., *A Concise History of the Iron Manufacture of the American Colonies up to the Revolution, and of Pennsylvania until the Present Time* (1876), 232, says that an unsuccessful attempt to use anthracite coal was made at Mauch Chunk in 1820. This statement is also made in Greeley, Horace, and others, *The Great Industries of the United States*, (1873), 352. An altogether unsubstantiated claim has been made that the first use of anthracite coal in generating steam occurred in Lebanon where a steam engine was used in connection with the Union Canal. For a statement of this claim, see *Hazard's Register*, VII, 332.
11. Clark, *op. cit.*, 412
12. Pearse, *op. cit.*, 233.
13. Clark, *op. cit.*, 413; Swank, James M., *Introduction to a History of Iron Making and Coal Mining in Pennsylvania*, 73-76.
14. *Alden's Appeal Record*, 93 Pennsylvania 191.
15. For accounts of the experiments made prior to 1840, see Swank, *Introduction to a History of Ironmaking and Coal Mining in Pennsylvania*, 72-75; Pearse, *op, Cit.*, 233-235.
16. Swank, *History of the Manufacture of Iron in All Ages*, 360, citing William Firmstone, "Sketch of Early Anthracite Furnaces" in *Transactions of American Institute of Mining Engineers*, III.
17. A good and convenient account of these technological changes is to be found in Bining, *The Rise of American Economic Life*, 244-246.
18. *Lebanon Courier*, February 6, 1847.
19. *Ibid.*, December 24, 1845.
20. *Ibid.*, December 24, 1845; January 7, 1846; March 18, 1846.
21. See, for example, an advertisement for teams in, *ibid.*, April 16, 1852.

22. See footnote 29, Chapter IV; see also "North Lebanon Railroad", in *Record of Court, In the Court of Common Pleas of Lebanon County, of August Term, 1851, No. 23*, pp. 119-129, hereinafter cited *Record of Court*. By October, 1855, this railroad was hauling to the Furnaces two hundred and fifty tons of ore daily, an amount that was soon increased to six hundred tons daily. *Lebanon Courier*, October 12, 1855, August 8, 1856.
23. Advertisement for bids to supply coal needed at the furnaces were inserted in the local press. Lebanon Courier, January 20, 1849.
24. Grittinger, Henry C., The Iron Industries of Lebanon County, in Lebanon County Historical Society, *Papers*, III, 12; *Documents Relating to the Manufacture of Iron in Pennsylvania, Anthracite Blast Furnaces*, Lebanon County, 1850; *Lebanon Courier*, February 6, 1847.
25. Testimony of Charles B. Forney, February 27, 1867, in "Testimony taken before John H. Briggs, Esq., Master in Chancery, on the part of Robert and G. D. Coleman, on the 19th day of June, 1866". *Record of Court, op cit.*, 177.
26. *Lebanon Courier*, March 11, 1848.
27. Grittinger, *op. cit.*, III, 12-13.
28. *The Philadelphia Press*, August 5, 1857.
29. Grittinger, *op. cit.*, III, 13.
30. *The Lebanon Daily Times*, September 10, 1878.
31. The relations of Mr. Coleman to this regiment can be followed in the columns of the *Courier*. See especially June 20, 1861, September 19, 1861, November 7, 1861, March 6, 1862, June 18, 1863, and December 3, 1863.
32. *Ibid.*, September 18, 1878; see also *ibid.*, September 11, 1878, and *The Lebanon Daily Times*, September 10, 1878. It was also reported that he had been offered the Republican nomination for Governor at the close of the War, and the position of either the Secretary of the Treasury or Secretary of the Interior by President Grant. There is a short sketch of Mr. Coleman in Egle, *op. cit.*, 264-265.
33. Grittinger, *op. cit.*, III, 13-14; see also *The Lebanon Daily Times*, June 24, July 1, July 24-26, 1901; for an account of the charitable nature of Mrs. Coleman, showing how she continued the philanthropic work of her husband after his death, see *The Daily Report*, August 20, 1894.
34. *Lebanon Courier*, May 9, 1856.
35. *Ibid.*, May 9, 1856; August 8, 1856; May 29, 1857.
36. The office building for the furnaces, erected in 1855-1856, was unusual in its fine appointments and was the subject of much favorable comment in the local press. The editor of the *Courier* compared it to a "banking house" in beauty. (May 9, 1856). The editor of *The Boy of Seventy-Six*, on November 13, 1855, said that for style it was unequaled in the state of Pennsylvania. The building had a forty-four foot frontage and contained a "spacious hall flanked by two rooms on the first floor, and an iron stair-way leading to two rooms on the second floor. These upper rooms are finished in frescoe, with a ceiling 16 feet high and ornamented with heavy cornice and centre-pieces. A fire-proof apartment has been placed over the hall. The building is heated by a furnace, and arrangements are progressing to light the rooms with gas".
37. *Lebanon Courier*, November 16, 1855, May 9, 1856.
38. Testimony taken before John H. Briggs, Esq., Master in Chancery, on the part of Robert and G. D. Coleman, on the 19th day of June, 1866. *Record of Court, op. cit.*, 170, see also the testimony of G. D. Coleman in *ibid.*, 186. "We first made iron successfully of anthracite coal with Cornwall ore in 1847 . . . The first iron we made was condemned—was considered a failure. Our iron was not proved until, I think, the fall of the year 1847.
37. Testimony taken before John H. Briggs, etc., in *Record of Court, op. cit.*, 171. The *Courier*, commenting on the early difficulties of putting the furnace into operation, attributed much of the success of the final solution of the problems to one Edward Gummer from the Harrisburg Furnace. Mr. Gummer "managed to put the Furnace in

operation, with perhaps less difficulty than has ever before been encountered by the most skilfull English and Welsh founders in the State". February 27, 1847.

40. *Ibid.*, February 6, 1847, March 18, 1848, July 22, 1848. The production of pig iron at the Furnace so amazed Editor Worth that he exclaimed, "a person is led to wonder to what use all the iron that is manufactured, can be put". March 18, 1848.
41. *Record of Court, op cit.*, 116, 88.
42. Testimony of Charles B. Forney, *ibid.*, 178.
43. *Ibid.*, 117; it should also be noted that occasionally these furnaces made special castings on order. See especially Cornwall Anthracite Furnaces, Memorandum Book, 1848-1849, July to September, 1849, during which time more than eighty tons of castings were sent from the Lebanon Furnaces to the Cornwall Anthracite Furnace then in the course of construction.
44. *Documents Relating to the Manufacture of Iron in Pennsylvania, 1850*, Anthracite Blast Furnaces, Lebanon County, 1850.
45. *Lebanon Courier*, June 1, 1855.
46. *Documents Relating to the Manufacture of Iron in Pennsylvania, 1850*, Anthracite Blast Furnaces, Lebanon County, 1850.
47. No books of record of these furnaces have been located; hence it is impossible to state with certainty just what were the annual wages paid to the workers, and the specific increment to the economy of the region cannot be ascertained. However, in the Testimony of Charles B. Forney, taken before John H. Briggs, Esq., in *Record of Court*, op. cit., 179-180, it is stated that the cost of labor, repairs and limestone at the furnaces from 1848 to 1858 was as follows:

1848	$33,360.55
1849	33,776.59
1850	34,750.23
1851	20,408.43
1852	24,534.43
1853	37,151.30
1854	46,100.53
1855	20,647.19
1856	34,432.74
1857	36,459.38
1858	33,484.84
	$355,106.21

This perhaps is indicative of the impact which these furnaces had upon the economy of Lebanon. In view of these figures, though, the estimate that Editor Worth made that $70,000 would be added to the wages of Lebanon seem too high. *Lebanon Courier*, February 6, 1847.

48. Ms. research paper by Miss Elizabeth Sattazahn, "The early history of the Lebanon Bank".
49. *Lebanon Courier*, 1855, 1856, *passim;* see also *Egle, op cit.*, 150; *Lebanon Courier*, December 29, 1864.
50. *Lebanon Courier*, June 15, 1857, et. seq.; February 4, 1864, March 31, 1864, December 29, 1864.
51. *Ibid.*, December 29, 1864.
52. Testimony of Charles B. Forney, *Record of Courts, op cit.*, 178. In 1863 G. D. Coleman reported a taxable income from all of his enterprises totaling $90,147. In that same year Robert Coleman reported as his income from the Cornwall ore hills the sum of $31,157. *Lebanon Courier*, February 23, 1865.
53. *Lebanon Courier*, June 22, 1855. This school was maintained on the same basis for many years after the death of Mr. Coleman by his widow and later by his children.
54. *Ibid.*, July 12, 1850.

55. *Ibid.*, July 10, 1857, see also *ibid.*, July 11, 1856, for an interesting account of the singing done by Mrs. Coleman's pupils.
56. *Ibid.*, November 6, 1857.
57. Grittinger, *op. cit.*, III, 13; *Lebanon Courier*, 1848-1861, *passim*.
58. See for example, letter to the editor, in *ibid.*, April 10, 1847.
59. *Ibid.*, May 29, 1857.
60. *Ibid.*, November 18, 1848.
61. *Ibid.*, March 25, 1848.
62. Cornwall Anthracite Furnaces. Private Memoranda, 1851-1854. That these weeks in May were busy ones for the Colemans is seen in a terse entry made on May 1, "We didn't *all* go Maying".
63. *Lebanon* Courier, August 4, 1854. The difficulties frequently met by iron masters are illustrated in a letter from R. W. Coleman to I .P. Morris and Company, November 27, 1854 in which he gives the reasons for postponing the completion of stack number two. "In the present state of the Money Market and the uncertainty of 'who is to fail next' among the purchasers of our iron we feel compelled, as a matter of prudence, to discontinue all building for the present. We are afraid to *Sell* and *even*, had we our new Furnace completed would be obliged to Keep the iron on *hand* under the circumstances we think it best for both parties to delay the placing of the Machinery regretting any disappointment to yourselves in the Matter we are determined not to go into the Money Market at the present ruinous rates. R. W. Coleman." Letter Book, R. W. and W. Coleman, 1848-1867.
64. Grittinger, *op. cit.*, III, 17; letter to I .P. Morris and Company, April 24, 1854, Letter Book, R. W. and W. Coleman, 1847-1867; *Directory of the Iron and Steel Works of the United States*, 21; *Documents Relating to the Manufacture of Iron in Pennsylvania*. Anthracite Blast Furnaces in Pennsylvania, Lebanon County, 1850, lists the height of stack number one as thirty-eight feet, but in view of the long association of Mr. Grittinger with the Colemans and the fact that the *Documents* were published prior to the completion of the furnace, Mr. Grittinger's figures have been accepted as correct.
65. Letter Book, R. W. and W. Coleman, 1848-1867, letter to I. P. Morris, February 28, 1854.
66. *Lebanon Courier*, June 6, 1861.
67. Grittinger, *op. cit.*, III, 18.
68. *Lebanon Advertiser*, June 25, 1851.
69. Letter Book, R. W. and W. Coleman, 1848-1867, letter to Messrs. Cabeen & Company, March 21, 1856.
70. *Record of Court*, *op. cit.*, 115. In 1857 coal was purchased from Tomkins, Price and Company in Pittston. The contract that year called for seven thousand tons of anthracite coal, to be delivered at the rate of twelve hundred tons per month at a cost of $1.14 per ton of 2240 pounds delivered in boats at Pittston. Letter Book, R. W. and W. Coleman, 1848-1867. Letters to Tomkins, Price and Company, May 20, 1857 and June 11, 1857.
71. *Ibid.*, letter to Cabeen and Company May 26, 1852; see also letter to Colwell and Company May 26, 1852, and letter to Henry G. Nichols, May 26, 1852.
72. Cornwall Anthracite Furnaces, Miscellaneous Accounts, 1851-1855.
73. Letter Book, R. W. and W. Coleman, 1848-1867.
74. Cornwall Anthracite Furnaces, Time Book, 1848-1861.
75. *Lebanon Courier*, December 23, 1853; Grittinger, *op. cit.*, III, 18-20. The attempt to use ore from the tract at Newmanstown did not succeed, hence ore from Cornwall was used exclusively almost from the beginning.
76. *Lebanon Courier*, April 14, 1854
77. Testimony of Simeon Guilford, *Record of Court*, *op. cit.*, 85-86. In 1854 Guilford was also a part owner of the Swatara Furnace in Schuylkill County.
78. Grittinger, *op cit.*, III, 19; *Lebanon Courier*, July 28, 1854.

79. *Lebanon Courier*, April 6, 1855; The diarist William Rank also records this event in his Diary.
80. *Lebanon Courier*, April 20, 1855, September 21, 1855, October 12, 1855, December 7, 1855, May 16, 1856, July 18, 1856.
81. *Ibid.*, April 24, 1857; testimony of Artemus Wilhelm, *Record of Court, op cit.*, 68. Prior to this time, in April, Mr. Weidman had sold out his interest in the company to the other members of the firm for the sum of $10,000. *Lebanon Courier*, April 24, 1857.
82. Testimony of Simeon Guilford, *Record of Court, op cit.*, 86.
83. *Lebanon Courier*, May 29, 1857.
84. Testimony of Artemus Wilhelm, *Rcord of Court, op. cit.*, 68-69.
85. Statement of David S. Hammond, No. 1, in *ibid.*, III; *Lebanon Courier*, October 1, 1858.
86. *Record of Court, op cit.*, 112.
87. *Lebanon Courier*, February 19, 1863.
88. Grittinger, *op cit.*, III, 20.
89. The men who thus failed to operate profitably the Dudley Furnace induced several other men to join them in forming the Millcreek Iron Company, a charter for which was granted by the State Legislature in May, 1857. So far as can be learned, however, the effects of the panic of that year prevented any operations being undertaken. Jonathan Illig, Henry H. Missemer, John George, and Christian Henry, all of Lebanon County, and Dr. William Moore and John A. Sheets of Berks County, joined with Krause, Guilford, Kline, and Shirk of the Dudley Iron Company to form the new one. *Lebanon Courier*, May 1, 8, 15, 29, 1857.
90. For a contemporary appraisal of this location and its economic importance, see *The Press* (Philadelphia), August 5, 1857.
91. Grittinger, *op. cit.*, III, 20-21, gives a brief history of this Machine Works. In 1860 William Weimer retired, the sons carrying on the work under the firm-name of P. L. Weimer and Brothers.
92. The partnership with Lash lasted only until March 1, 1856. *Lebanon Courier*, March 7, 1856; see also advertisement in *ibid.*, May 30, 1856.
93. *Ibid.*, October 3, 1856.
94. *Ibid.*, May 1, 1857; September 13, 1860.
95. *Ibid.*, October 24, 1856; January 23, 1857; May 1, 1857.
96. Advertisement in *Lebanon Courier*, January 30, 1857.
97. *Ibid.*, October 24, 1856.
98. *Ibid.*, January 23, 1857. The editor commented on the fact that "many strange faces" were to be seen at Weimers who would be induced "to make this their permanent home."
99. Letter of L. R. Hynicka to Mr. Weimer, December 17, 1864, quoted in *ibid.*, December 29, 1864. See also, *ibid.*, February 13, 1857, September 6, 1860.
100. Cornwall Furnace, Blast and Pig Iron, 1848-1867, September 25, 1861.
101. After printing twenty-two issues of the *Courier*, Mr. Worth reported that he had used one ton of Chestnut coal at a cost of $2.75. Since he had a circulation of 1500 copies, the cost of one side of a page he figured to be six and one-quarter cents per issue. *Lebanon Courier*, April 16, 1858; see also *ibid.*, June 26, 1857, September 4, 1857, November 20, 1857, February 28, 1861, August 17, 1865.
102. For brief descriptions of these inventions, and others, see *ibid.*, February 5, 1858, November 26, 1858, March 7, 1861. In 1863 the Reading Railroad Company contracted for 2400 locks of Mr. Weimer's invention. *Ibid.*, December 3, 1863.
103. *Ibid.*, January 29, 1863, October 22, 1863.
104. *Ibid.*, July 4, 1861, April 10, 1862. Patents for these inventions were granted in May, 1862.
105. At the close of the year 1861 the foundry employed only a few men instead of more than one hundred which it had employed previously. *Lebanon Courier*, December 19, 1861.

106. *Ibid.*, Septmber 5, 1861, September 26, 1861, November 14, 1861, December 19, 1861, November 13, 1862. Editor Worth, in 1861, visited the Weimer Machine Works to observe the process of making these guns. He reported on this visit in the issue of December 19, 1861. Because this report is invaluable for the picture it gives of the industrial development at Weimers, and for the descriptions given of the various processes used, it is cited here at some length.

"On entering the works but a short time ago so busily employed in the art of peace, we find all changed. Cannon in all conceivable processes of manufacture are slowly revolving in the lathes and passing back and forth under the cutter of the planing machines. Passing to the upper end of the works we come to a lot of guns in the rough, on heavy trestles. At one end of this trestle stands the first machine used in converting these unsightly blocks of wrought iron into the handsomee finished guns. This machine . . . has been called the devil; the gun is rolled into the devil and adjusted with screws into a central position, when a drill at each end drills in the center on which the guns revolve in the lathes; it is then rolled on a truck about three feet high and conveyed to the boring lathes . . . ; the gun being secured in the lathe and set revolving, the first operation is to turn a neck for the rest, which being accomplished, the back head of the lathe is removed, the rest placed in position; the process of boring now commences, the muzzle end of the gun revolving in the rest . . . .

"The bore or hole of the gun when finished had a handsome polish and of exactly three inches diameter, a variation of one hundreth of an inch from standard size only being allowed. A plug is now driven into the bore of the gun and it is rolled into the truck to be conveyed to the roughing-lathe. In this lath it is turned down to within 10-100 of an inch of its finished size. Great huge chips, in the form of curls, twist and squirm like serpents from the cutters of these lathes, some running out to the length of one hundred feet.

"When the gun enters the roughing lathes, its weight is near 1800 lbs. on leaving it, it has been reduced to 900 lbs. or one-half of its original weight.

"From the roughing lathe the gun is taken to the trunion lathe for turning the trunions or parts on which the gun rests on the carriage. This is an operation that requires skill and care. . . .

"On leaving the trunion lathe, the form lathe is the next in rotation that receives the gun. This lathe has a former piece of iron shaped to correspond with the exact form of the finished gun. The cutter carriage works on slides, and a guide wheel on the back side of this carriage runs against the form, causing the carriage and cutter to have a longitudinal motion with the finished shape of the gun.

"From the form lathe the gun is transferred to the planing machine, for the purpose of planing out the portion between the trunions that cannot be reached on the lathe. Finished on the planing machine, it is passed into the hands of the chipper, who with hammer and chisel, chips away the portions around the trunions that cannot be reached by the planing machine or lathe. The rough filers next receive the gun, their business being to rough-file the parts operated upon the chipper and planing machine. The gun is now taken to the finishing lath, where it is polished with emery. The process of polishing is very simple: the gun being coated with oil, emery of a coarse grade is sprinkled over it, a stick with a piece of sheet lead is now pressed against the gun, which is revolving with great rapidity. As the *polish comes out* finer grade of emery is used until the entire gun glistens like a mirror. On leaving the polishing lathe the gun is finished, save the portions around the trunions that have been chipped and planed. This portion is now operated upon by the finisher, with smooth files and sticks of fine wood coated with various grades of emery. The gun is now finished and presents a strange contrast to the rough blocks lying opposite it on the left. The rough gun . . . has passed down one side and made the entire circuit of the machine department of the works, returning to within ten feet of its starting point, and is boxed up for shipment."

107. Grittinger, *op. cit.*, III, 21.
108. Lebanon County Historical Society, Miscellaneous Manuscripts, Account of Meily, Weimer & Co., with George Krause, April to August, 1865. *Lebanon Courier*, March 31, 1864, May 5, 1864, June 23, 1864, January 4, 1865.
109. Mr. P. L. Weimer was also interested in another project which got underway at the very close of the Civil War. In company with D. M. Karmany and Henry T. Hoffman, he erected a pipe mill in east Lebanon in 1864 and 1865. *Lebanon Courier*, August 25, 1864, November 10, 1864, 1865, passim.
110. *Directory of the Iron and Steel Works of the United States*, 17; Egle, *op. cit.*, 215; *Lebanon Courier*, October 2, 1863, August 13, 1863, November 23, 1865.
111. Grittinger, *op cit.*, III, 23-25; *Lebanon Courier*, September 1, 1864; *Directory of the Iron and Steel Works of the United States*, 110.
112. *Lebanon Courier*, August 5, 1846, December 6, 1850, September 8, 1854, December 29, 1854; *Lebanon Advertiser*, October 2, 1850. Another small foundry which may be mentioned is the Myerstown Foundry. Like the Annville Foundry, it too contributd very little to the economic development of the county. Erected originally in 1838 by Daniel Meyer in Myerstown, it was torn down shortly after the opening of operations and rebuilt on a tract of land lying along the Union Canal. This foundry was operated by horse-power and made small castings only. It remaind in operation under several different owners until 1871 when it was completely destroyed by fire. Joseph Painter, who in 1865 had purchased a one-third interest in it, bought the land on which the foundry had been built and erected a much larger plant. Grittinger, *op. cit.*, III, 9-10; *Lebanon Courier*, December 23, 1848, February 2, 1865, March 2, 1865.
113. *Ibid.*, August 7, 1847, September 16, 1847. *Lebanon Advertiser*, February 13, 1850.
114. *Lebanon Courier*, April 8, 1848, February 22, 1850, January 4, 1866. Diary of William Rank, June 14, June 19, 1860.
115. Grittinger, *op cit.*, III, 16-17.
116. *Lebanon Courier*, February 9, 1855, June 15, 1855, July 20, 1855, May 8, 1857.
117. *Ibid.*, October 5, 1856.
118. *Ibid.*, May 8, 1857, July 30, 1858, December 30, 1858.
119. *Ibid.*, November 12, 1863, April 21, 1864, March 23, 1865, September 28, 1865.
120. *Ibid.*, June 5, 1862.
121. *Ibid.*, December 21, 1865, December 28, 1865.
122. Grittinger, *op cit.*, III, 22; *Lebanon Courier*, September 17, 1863.
123. *Ibid.*, December 12, 1856, October 16, 1857; Grittinger, *op cit.*, III, 21-22.
124. *Lebanon Courier*, October 16, 1857.
125. In 1857 this forge used on the average about thirty tons of charcoal iron per week. R. W. and W. Coleman, Letter Book, 1848-1867.
126. *Lebanon Courier*, March 7, 1863.
127. *Ibid.*, February 19, 1863.
128. *Ibid.*, August 3, 1865, November 23, 1865.
129. Grittinger, *op cit.*, III, 23.
130. Ms. Subscription Book of the "Lebanon Manufacturing Company", 1867. Lebanon County Historical Society, Misc. Mss.
131. Grittinger, *op cit.*, III, 25-26; Egle, *op. cit.*, 154; see also the many advertisements and notices in the *Lebanon Courier*, 1867 *et seq.* These latter two companies along with the Lebanon Rolling Mills, which were erected late in 1867, ushered in a new era for Lebanon and the iron industry and hence are only briefly mentioned here. The Lebanon Rolling Mills originally consisted of two small heating furnaces and one small puddling furnace. Later, operations were greatly expanded to include the making of light sheet iron. Egle, *op cit.*, 155.
132. *Lebanon Courier*, March 16, 1865. That "new day" arrived sooner than Mr. Worth expected, and his lamentations gave way to "allelujah's". But a study of that "New day" cannot be made here.

BIBLIOGRAPHY

BIBLIOGRAPHICAL AIDS:

Bausman, L. M., *Bibliography of Lancaster County*, 1745-1912. Philadelphia, 1916.

Bining, Arthur C., Robert L. Brunhouse, and Norman L. Wilkinson, *Writings on Pennsylvania History, A Bibliography*. Harrisburg, Pennsylvania Historical and Museum Committee, 1946.

Bowman, Charles M., Lebanon County; A Study of its Newspapers, Lebanon County Historical Society *Papers*, I, No. 17, (1902).

Brigham, Clarence S., *Bibliography of American Newspapers*, 1690-1820. American Antiquarian Society *Proceedings*, n.s., XXIX, (1920); XXX, (1920); XXXII, (1922).

Buck, Solon J., *Travel and Description*, 1765-1865, Illinois Historical Society *Collections*, IX, (1914).

Croll, P. C., Lebanon County Imprints and Bibliography, Lebanon County Historical Society *Papers*, IV, (1908).

Edwards, Everette E., *A Bibliography of the History of Agriculture in the United States*. Washington United States Government Printing Office 1930. Unitd States Department of Agriculture. Miscellaneous Publications, No. 84.

Griffin, Appleton, P. C., Bibliography of American Historical Societies. *In* American Historical Association *Annual Report*, 1905. Washington, United States Government Printing Office, 1907.

Griffin, Grace G., and others, eds. *Writings on American History; A Bibliography of Books and Articles on United States History, 1906-1938*. New York, Washington and New Haven, 1908-1942.

Hasse, Adelaide R., *Index of Economic Material in the Documents of the States of the United States*. (1789-1904). Washington, Carnegie Institution, 1919-22.

Hasse, Adelaide R., Guide to the Archives of the Thirteen Colonies, American Historical Association *Reports*, 1906, II.

Hildeburn, Charles S., *A Century of Printing*: The Issues of the Press in Pennsylvania, 1685-1784. Philadelphia, Matlack and Harvey, 1885-1886. 2 vols.

Kelsey, Rayner W., Description and Travel as Source Material for the History of early agriculture. American Historical Association *Reports*, 1920.

Kelsey, Rayner W., Possibilities of Intensive Research in Agricultural History, American Historical Association *Reports*, 1919, vol. I.

List of Writings of I. D. Rupp, *Pennsylvania Magazine of History and Bibliography*, XV, (1891).

Long, Harriet C., A Select Bibliography (of the Pennsylvania German) submitted in partial fulfillment of the requirements for the degree of B.L.S. New York State Library School (1910), in *Pennsylvania German*, XI, 1910.

Pennsylvania State Library, *Checklist of Laws, Minutes, Journals and Documents published by Pennsylvania*, 1682-1898. Report of the State Librarian of Pennsylvania, 1900. Harrisburg, Ray, 1901.

Pennsylvania State Library, *Checklist of Pennsylvania county, town and township histories*. Report of the State Librarian of Pennsylvania 1891. Harrisburg, 1892.

Poore, Ben. Perley, *A Descriptive Catalogue of the Government Publications of the United States*, September 5, 1774—March 4, 1781. Washington, Government Printing Office, 1885.

Schmidt, Louis B., *Topical Studies and References on the Economic History of American Agriculture*. Philadelphia, McKinley, 1919.

Tables of and Annotated Index to the Congressional Series of United States Public Documents. Prepared in the Office of the Superintendent of Documents. Washington, Government Printing Office, 1902.

Tucker, Gilbert M., *American Agricultural Periodicals*. Albany, 1909.

United States Library of Congress, *A check-list of American 18th Century Newspapers in the Library of Congress.* Compiled by John Van Ness Ingram. Washington, Government Printing Office, 1912.

United States Library of Congress. *Check-list of Collections of Personal papers in historical societies, university and public libraries.* Washington, Government Printing Office, 1918.

Wilson, H. W., Standard *Catalog for public libraries: history and travel section; an annotated list of 1900 titles with a full analytical index.* Compiled by Minnie E. Sears. New York, The H. W. Wilson Company, 1929.

MANUSCRIPT SOURCES:

Albert, A. H., Diary, 1867-1891. Private Collection.

Berks and Dauphin Turnpike Road MSS. Subscription Book; Treasurer's Account Book, 1820-1835; Correspondence, 1836-1904; Toll Gate Records, 1820-1855; Minute Book, 1816-1857; Letter Book, 1812-1884.

Brief of Title to the Cornwall Ore Banks and Mine Hills Situate in Cornwall Borough, Lebanon County, Pa, Prepared by Paul Grittinger, 1932, from incompleted data of Henry C. Grittinger, deceased, who for fifty-two years was associated with the Cornwall, Pa. interests. Lebanon County Historical Society.

Colebrook Furnace MSS. Journals, 1791-1863; Ledgers, 1791-1863; Blast Books, 1848-1857; Time Books, 1791-1862; Pig Iron, 1792-1858; Cordwood, 1792-1859; Cash Books, 1791-1858; Ore Books, 1794-1848; Castings Made, 1822-1853; Memoranda, 1800- 1815. Private Collection.

Coleman, R. W., and W., Iron Ore, 1860-1864; Letter Book, 1848-1867; Copper Ore, 1853-1861. Private Collection.

Coleman, Robert W., Letter Book, 1848-1867. Private Collection.

Cornwall Anthracite Furnaces MSS. Journals, 1848-1861; Ledgers, 1848-1861; Blast Books, 1848-1861; Time Books, 1848-1861 Pig Iron, 1858-1869; Miscellaneous Accounts, 1851-1855; Memorandum Book, 1848-1849; Private Memoranda, 1851-1854. Private Collection.

Cornwall Charcoal Furnace MSS. Day Books, 1764-1865; Journals, 1764-1868; Ledgers, 1764-1861; Blast and Pig Iron, 1776-1883; Time Books, 1776-1864; Coal and Cordwood, 1776-1848; Cash Books, 1779-1870; Provision Books, 1820-1872; Sundry Provisions, 1832-1864. Private Collection.

Cornwall Township Assessment List, 1854. Lebanon County Historical Society.

Dauphin County. Deed Books, Recorder of Deeds Office, Harrisburg.

Donges, George, Day Book, 1834-1840. Lebanon County Historical Society.

Frantz, Theodore, Day Book, 1830. Private Collection.

Greenawalt, Leonard, Account Book, 1801-1807. Lebanon County Historical Society.

Grittinger, Adam, Correspondence, 1847-1849. Lebanon County Historical Society.

Grittinger, Paul MSS. Lebanon County Historical Society. Contains many manuscripts and attested copies of manuscripts dealing with Cornwall and the Coleman family.

Grubb, Edward Burd, Life and Letters of Edward Burd Grubb. Two volumes of typed. copy. Lebanon County Historical Society.

Heidelberg Paper Mill, Ledger, 1831-1833 . Lebanon County Historical Society.

Heilman, C. G., Account Book, 1850-1857. Private Collection.

Hoffman, Daniel, Account Book, 1843-1862. Private Collection.

Hopewell Forge MSS. Journal, 1803-1817; Ledger, 1803-1816, Time Book, 1803-1816; Coal and Cordwood, 1803-1816; Cash Books, 1803-1817, Anchonies, 1811-1816. Private Collection.

Lancaster County, Miscellaneous Papers, 1724-1772. Historical Society of Pennsylvania.

Lancaster County Archives. Deed Books; Wills; Assessment Lists. Lancaster.

Landis, Michael and Jacob L. Miller Company. In the Trade of Black Smithing. Commenced May 3rd A.D. 1850 during the term of One Year. Journal. Private Collection.

Lebanon Borough. Assessment Books. Lebanon County Historical Society.

Lebanon County Archives. Assessment Lists; Wills; Deed Books; Orphans' Court Docket, Lebanon.

Lebanon County Ground Rents. Compiled by Adam Grittinger. Lebanon County Historical Society.

Lebanon County, Manuscripts Relating to Lebanon County. Historical Society of Pennsylvania.

Lebanon Female Seminary. Account Book, 1837-1856. Lebanon County Historical Society.

Lebanon Manufacturing Company. Subscription Book, 1867. Lebanon County Historical Society.

Lebanon County Miscellaneous Manuscripts, 18th century, chiefly deeds, indentures, wills, etc. Lebanon County Historical Society.

Montgomery, Charles B. Collection. Lebanon Valley College Library.

Norris MMS. Historical Society of Pennsylvania. Contains a draft of Lebanon County.

Pennsylvania Counties, Miscellaneous Manuscripts. Historical Society of Pennsylvania.

Rank, William, Diaries, 1851-1881. Lebanon County Historical Society.

Schmauk, Rev. Theodore MSS. Lebanon County Historical Society.

Shadle, Charles, Day Book, 1829-1851. Lebanon County Historical Society.

Speedwell Forge MSS. Journals, 1784-1833; Ledgers, 1784-1832; Time Books, 1806-1868; Coal and Cordwood, 1812-1861; Cash Books, 1788-1869; Anchonies, 1832-1848: Bar Iron, 1784-1853, Private Collection.

Store Journal, 1796-1804. Lebanon County Historical Society.

Strickler's Mill MSS. Ledgers, 1871-1903; Day Books, 1863-1911. Private Collection.

Stumpstown (Fredericksburg). Rent Roll, 1783. Lebanon County Historical Society.

Union Forge MSS. Journals, 1783-1795; Ledgers, 1783-1795; Time Book, 1783-1795; Coal, Cordwood, and Iron, 1784-1795; Pig and Bar Iron, 1784--1795. Private Collection. Journal, 1868-1877. Lebanon County Historical Society.

Weidman MSS. Title Book of Real Estates of John Weidman; Miscellaneous Manuscripts of the Weidman family. Private Collection.

Worth, T. T., MSS. Correspondence, 1845-1865. Lebanon County Historical Society.

GENERAL PRINTED SOURCES:

Acrelius, Israel, *A History of New Sweden, or the Settlements on the River Delaware.* Translated from the Swedish by W. M. Reynolds. Historical Society of Pennsylvania, *Memoirs*, vol. IX. Philadelphia, 1874.

A Journey on Horseback, 1799. *Pennsylvania Magazine of History and Biography*, XIV (1890).

Alden's Appeal Record. Reported 93 Pennsylvania 182. Philadelphia, 1882.

American Husbandry: Containing an Account of the Soil, Climate, Production and Agriculture of the British Colonies in North America and the West Indies; with Observations on the Advantages and Disadvantages of settling in them, compared with Great Britain and Ireland. By an American. 2 volumes. London, 1775.

Bartram, John, *Observations on the inhabitants, climate, soil, rivers, production, animals, and other matters worthy of notice, made by Mr. John Bartram in his travels from Pensilvania to Onandago, Oswago, and the lake Ontario in Canada. To which is annexed a curious account of the Cataracts at Niagara, by Mr. Peter Kalm.* London 1751. Reprinted Geneva, New York, 1895.

Benton, C., and S. F. Barry, *A Statical View of the Number of Sheep in the Several Towns and Counties in Maine, New Hampshire, Vermont, Massachusetts, Rhode Island, Connecticut, New York, Pennsylvania, and Ohio.* Cambridge Folsam, Wells, and Thurston 1837.

Callender, Guy S., *Selections from the Economic History of the United States, 1765-1860.* New York, 1909.

Carver, Jonathan, *Three Years Travel through the Intrior Parts of America.* Edinburgh, 1798.

Cazenove, Theophile, *Cazenove Journal, 1794: A Record of the Journey of Theophile Cazenove Through New Jersey and Pennsylvania.* Edited by R. W. Kelsey. Haverford College Studies No. 13. Haverford, The Pennsylvania History Press, 1922.

Cornwall Ore Bank Company. *Articles of Association of the Cornwall Ore Bank Company,* with Full minutes, 1864-1882. n.p.n.d.

Coxe, Tench *View of the United States of America.* Philadelphia, 1794.

Crevecoeur, Michel, (St. John), "Crevecoeur on the Susquehanna, 1774-1776. Edited by H. L. Bourdin and S. T. Williams. *Yale Review,* N.S. XIV, (1925).

Crevecoeur, Michel, (St. John), *Letters from an American Farmer, describing certain provincial situations, manners and customs . . . written for the information of a friend in England,* London 1782; reprinted with little change, Philadelphia, 1793.

Crevecoeur, Michel (St. John), *Sketches of Eighteenth Century America.* Edited by Henri L. Bourdin, Ralph H. Gabriel, and Stanley T. Williams. New Haven, Yale University Press, 1925.

Cutler, William P. and Julia P. Cutler, *Life, Journals, and Correspondence of Rev. Manasseh Cutler.* Two Volumes. Cincinnatti, 1888.

Documents Relating to the Manufacture of Iron in Pennsylvania. Published on behalf of the Convention of (Pennsylvania) Iron Masters which met in Philadelphia on the Twentieth of December, 1849. Philadelphia, the General Committee, 1850.

Force, Peter, *Tracts and Other Papers relating to the Origin, Settlement and progress of the Colonies in North America.* 4 volumes. Washington, 1836-1846.

Gordon, Thomas F., *A Gazetteer of the State of Pennsylvania.* Philadelphia 1832.

Graydon, Alex., Letter of Alex. Graydon to Jedediah Morse, Louisbourg, March 5, 1789, *The Pennsylvania Magazine of History and Biography,* VI, (1882).

Heckewelder, John, Narrative of John Heckwelder's Journey to the Wabash in 1792, *The Pennsylvania Magazine of History and Biography,* XII, (1888).

Hermelin, Samuel G., *Report About the Mines in the United States of America,* 1783. Translated from the Swedish with Introduction and Notes by Amandus Johnson. Philadelphia, John Morton Memorial Museum, 1931.

Kalm, Peter, *Travels into North America, 1748-1750.* Translated by John R. Foster. 3 Volumes. London, 1770-1771.

Laws and Ordinances of Lebanon Borough, 1821-1871.

Lebanon, Worth and Reinoehl, 1871.

Letters on Agriculture From His Excellency George Washington President of the United States to Arthur Young and Sir. John Sinclair, etc. Edited by Franklin Knight. Philadelphia 1847.

Martin, Ada E., and H. H. Shenk, *Pennsylvania History Told By Contemporaries.* New York, Macmillan, 1925.

Message from the Governor of Pennsylvania, Transmitting a list of the Taxable Inhabitants, With the Number of Deaf, Dumb, and Blind Persons in this Commonwealth. A Boyd Hamilton, State Printer, 1857.

Michaux, Andre, *Portions of the Journal of Andre Michaux, botanist, written during his travels in the United States and Canada, 1785-1796.* With an Introduction and explanatory notes by C. S. Sargent. Philadelphia, 1889.

Mittelberger, Gottlieb, *Gottlieb Mittelberger's Journey to Pennsylvania in the year 1750 and Return to Germany in the year 1754.* Translated from the German by Carl T. Eben. Philadelphia, John J. McVey, 1898.

Morse, Jedidiah, and Richard C. Morse, *A New Universal Gazeteer, or Geographical Dictionary.* Fourth edition. New Haven, 1823.

Muniments of Title of the Cornwall Estate. Compiled and carefully compared with the originals, at the instance of A. Wilhelm, Att'y for R. W. Coleman's Heirs. 1872.

Myers, Albert C., Editor, *Narratives of Early Pennsylvania, West New Jersey and Delaware.* New York, Scribners, 1912.

Penn, John Penn's Journal of a visit to Reading, Harrisburg, Carlisle and Lancaster, in 1788, *The Pennsylvania Magazine of History and Biography*, III, (1879).

Penn-Logan Correspondence, 1700-1750. Edited by Edward Armstrong. Historical Society of Pennsylvania, Memoirs, volumes IX and X. Philadelphia, 1870-1872.

Record of Court. In the Court of Common Pleas of Lebanon County, of August Term, 1851, No. 23., etc. Robert W. Coleman v. William Coleman, Robert Coleman, G. Dawson Coleman, Edward B. Grubb, and Clement B. Grubb. In Equity.

Records of the Moravian Congregation in Hebron, 1775-1781. *The Pennsylvania Magazine of History and Biography*, XVIII, (1894.

Rupp, I. Daniel, *A Collection of Upwards of Thirty Thousand Names of German, Swiss, Dutch, French and Other Immigrants in Pennsylvania from 1727-1776.* Philadelphia, 1876.

Schaeffer, Eugene, Translations from Zinzendorf's Diary of Journeys among the Indians. *Transactions* of the Moravian Historical Society, vol. I.

Schoepf, Johann David, *Travels in the Confederation, 1783-1794.* Translated by A. J. Morrison. 2 volumes. Philadelphia, 1911.

Schoepf, Dr. John D., Travels Through Berks County in 1783. *The Pennsylvania Magazine of History and Biography*, V, (1881).

Scott, Joseph, *A Geographical Description of Pennsylvania.* Philadelphia, 1806.

Thwaite, R. G., editor, *Early Western Travels, 1748-1846.* 32 volumes. Cleveland, 1904-1907.

Union Canal. *Annual Report of the Union Canal Company.* Especially those for the years 1851, 1856, 1858.

Weld, Isaac, *Travels Through the States of North America, 1795-1797.* London, 1799. 4th edition, 2 volumes, 1807.

OFFICIAL PRINTED SOURCES:

Pennsylvania, *Acts of the General Assembly of the Commonwealth of Pennsylvania*, 1815. Harrisburg, 1816.

Pennsylvania, Agriculture, State Board of, *Annual Reports.* 1877-1894. Harrisburg. 1878-1895.

Pennsylvania Archives, Seven Series. 101 volumes. Philadelphia and Harrisburg, 1852-1914.

Pennsylvania Colonial Records. Minutes of the Provincial and of the Supreme Executive Council. Edited by Samuel Hazard. 16 volumes. Harrisburg, 1852-1853.

Pennsylvania, *Journals of the House of Representatives of the Commonwealth of Pennsylvania, 1776-1781.* Edited by Michael Hillegas. Philadelphia, 1782.

Pennsylvania, *Journals of the House of Representatives of Pennsylvania, 1790-1861.* Philadelphia, Lancaster, and Harrisburg, 1790-1861.

Pennsylvania, *Laws of the General Assembly of Pennsylvania, Passed at the Session, 1836-1837.* Harrisburg, 1837.

Pennsylvania Statutes at Large, 1700-1809. Edited by James T. Mitchell and Henry Flanders. 18 volumes. Harrisburg, 1896-1915.

Pennsylvania Geological Survey, First. *Annual Reports.* 1836-1841. Harrisburg, 1836-1841.

Pennsylvania Geological Survey, Second. *The Annual Report.* 1885. Harrisburg, 1886.

Pennsylvania *Summary Final Report on the Geology of Pennsylvania.* Harrisburg. 1892.

United States, *Heads of Families at the First Census of the United States Taken in the Year 1790. Pennsylvania.* Washington, Government Printing Office, 1908.

United States, *Third Census,* 1810. Washington, 1813.

United States, Congress, *House Executive Document* No. 263, 22nd. Cong. 1st Sess. Serial No. 221. Vol. VI, Population Statistics, Fifth Census, 1830.

United States, Congress, *Executive Document* No. 74, 27th Cong. 2nd Sess. Serial No. 402. (Patents granted 1841-1842.)

United States, Congress, *Executive Document* No. 76, 27th Cong. 2nd Sess. Serial No. 402. Abstracts of Sixth Census, 1840.

United States, Congress, *Senate Executive Document* No. 39, 35th Cong. 2nd Sess. Serial No. 984. Abstract of Statistics of Manufactures, Seventh Census, 1850.

United States, Congress, *House Executive Document* No. 116, 37th Cong. 2nd Sess. Serial No. 1137. Preliminary Report Eighth Census, 1860.

United States, *Ninth Census.* 3 volumes. Washington. Government Printing Office, 1872. Serial Numbers, 1473, 1474, 1475.

United States, *A Compendium of the Ninth Census.* Washington, Government Printing Office, 1872.

United States, Congress, *Senate Report,* No. 1394, 52nd Cong. 2nd Sess. Washington, 1893. Wholesale prices, wages, and transportation, 1840-1891.

United States, Geological Survey Bulletin, No. 315. Spencer, Arthur C., *Magnetite Deposits in Berks and Lebanon Counties.* Washington, 1907.

United States, Geological Survey Bulletin, No. 359. Spencer, Arthur C., *Magnetic Deposits of the Cornwall Type.* Washington, 1908.

NEWSPAPERS:

A. English

Boy of Seventy-Six, The, 1855-1856.
Evening Report, 1885-1900.
Lancaster Journal, 1810.
Lebanon Advertiser, 1849-1852.
Lebanon Courier, 1836, 1844-1889.
Lebanon Daily News, The 1874-1891.
Lebanon Daily Times, 1876-1905.
Lebanon Republican, 1824.
Lebanon Valley Standard, 1874-1879; 1884-1885.
North American and United States Gazette, 1857.
Pennsylvania Gazette, 1773.
Press, The, 1857.

B. German

Frei Libanoner, Der, 1807-1809.
Libanon Demokrat, 1845-1863.
Libanoner Morgenstern, 1811-1836.
Pennsylvanische Beobachter, Der, 1826.
Pennsylvanische Staatsbote, 1773.

Unpartheyische Berichter, Der, 1820.
Vaterland Wachter und Dauphin und Libanon Demokrat, 1833.
Wahre Demokrat und Folks Advocat, 1842-1844.
Weltbothe, Der, 1809.

GENERAL SECONDARY WORKS:

Agricultural History, A History, published by the Agricultural History Society. Baltimore 1927-.

Agriculture, its early history and development in Pennsylvania, and its present status. Annual Report of the Bureal of Industrial Statistics, 1874-1875. Harrisburg. 1875.

Bagnall, W. R., *Textile Industries, 1789-1810.* 2 volumes. Cambridge, 1893.

Bailey, L. H., ed., *Cyclopedia of American Agriculture.* 4 volumes. New York, Macmillan, 1912.

Beck, Clara A., A "Wheat Market" of Colonial Days, *The Pennsylvania German*, XII, (1911).

Beck, Herbert H., Cannon Hill and the Hessian Ditch with Personal Reminiscences of the Furnace Hills, Lancaster County Historical Society *Papers*, XLIV, No. 2, (1940).

Bellows, H. A., *A Short History of Flour Milling.* Minneapolis, 1924.

Bezanson, Anne, Robert D. Gray, and Miriam Hussey, *Prices in Colonial Pennsylvania.* Philadelphia, University of Pennsylvania Press, 1935.

Bidwell, Percy W., and John I. Falconer, *History of Agriculture in the Northern United States, 1620-1860.* Washington, 1925.

Bierman, E. Benj., A Visit to Annville Sixty Years Ago, Lebanon County Historical Society Papers, I, No. 8, (1899).

Bining, Arthur C., *British Regulation of the Colonial Iron Industry.* Philadelphia, University of Pennsylvania Press, 1933.

Bining, Arthur C., The Iron Plantations of Early Pennsylvania, *Pennsylvania Magazine of* History and Biography, LVII, (1933).

Bining, Arthur C., *Pennsylvania Iron Manufacture in the Eighteenth Century.* Harrisburg, Pennsylvania Historical Commission, 1938.

Bining, Arthur C., *The Rise of American Economic Life.* New York, Scribner's. 1943.

Biographical Annals of Lebanon County, Pennsylvania. Chicago, J. H. Beers and Co., 1904.

Bishop, Avard L., The State Works of Pennsylvania. *Transactions* of the Connecticut Academy of Arts and Sciences, XIII, (1907).

Bishop, J. L., *A History of American Manufactures from 1608-1860.* 3 volumes. Philadelphia, 1866-1868.

Belles, Albert S., *Pennsylvania, Province and State; A History from 1609-1790.* 2 volumes. Philadelphia, 1899.

Brendle, A. S., *A Brief History of Schaefferstown.* York, Dispatch Publishing Company, 1901.

Brendle, D. R., and David Lick, Plant Names and Plant Lore Among the Pennsylvania-Germans. Pennsylvania German Society *Proceedings*, XXXIII, (1923).

Breslin, William M., A History of Lebanon County Prior to 1876. Lebanon County Historical Society *Papers*, VI, No. 16, (1913).

Brewer, W. N., A History of American Agriculture. *Tenth Census*, 1880, volume III

Brown, Amos P., and Frederick Ehrenfeld, Minerals of Pennsylvania, Topographic and

Geologic Survey of Pennsylvania. *Report*, Number Nine. Harrisburg, 1913.

Campbell, Harry H., *The Manufacture and Properties of Iron and Steel.* New York, The Engineering and Mining Journal, 1903.

Carrier, Lyman, *The Beginnings of Agriculture in America.* New York, McGraw Hill Book Co., 1923.

Carver, T. N., Historical Sketch of American Agriculture. Bailey, L. H., ed., *Cyclopedia of American Agriculture*, volume IV. New York, Macmillan, 1912.

Clark, Victor S., *History of Manufactures in the United States.* 2 Volumes. Published for the Carnegie Institution of Washington by the McGraw Hill Book Co., New York, 1929.

Connor, L. G., A Brief History of the Sheep Industry in the United States. American Historical Association *Report*, 1918, volume I. Washington, Government Printing Office, 1921.

Croll, Rev. P. C., *Ancient and Historic Landmarks in the Lebanon Valley.* Philadelphia, Lutheran Publication Society, 1895.

Croll, Rev. P. C., Lebanon and its Environs; a Brief Historical Sketch. The Pennsylvania German Society *Proceedings*, XIV, (1903).

Day, Sherman, *compiler, Historical Collections of the State of Pennsylvania*, Philadelphia, 1843.

Delafield, Joseph L., Notes on the Life and Work of Robert Coleman. *Pennsylvania Magazine of History and Biography*, XXXVI, (1913).

Directory of the Iron and Steel Works of the United States. Prepared and Published by the American Iron and Steel Association. Philadelphia, 1884.

Donehoo, George P., *Harrisburg, the City beautiful, romantic, historic.* Harrisburg, Telegraph Press, 1927.

Donehoo, George P., *Pennsylvania, A History.* 7 volumes. New York and Chicago, Lewis Hist. Pub., 1926.

Dotterer, Henry S., *Rev. John Philip Boehm.* Philadelphia, 1890.

Dunaway, Wayland F., *A History of Pennsylvania.* New York, Prentice Hall, 1935.

Dunaway, Wayland F., The French Racial Strain in Colonial Pennsylvania. *Pennsylvania Magazine of History and Biography*, LIII, (1929).

Early, Martin H., compiler, *A History and Directory of Palmyra, Pa.* New York, 1898.

Edwards, Richard, editor, *Industries of Pennsylvania: Cities of Harrisburg and Lebanon.* Philadelphia, Richard Edwards, 1880.

Eggleston, Edward, Husbandry in Colonial Times. *Century Magazine, XXVII*, (1883-84).

Egle, William H., *An Illustrated History of the Commonwealth of Pennsylvania.* Philadelphia, E. M. Gardner, 1880.

Egle, William H., *History of the Counties of Dauphin and Lebanon in the Commonwealth of Pennsylvania.* Philadelphia, Everts and Peck, 1883.

Eighty Years' Progress of the United States: A Family Record of American Industry, Energy and Enterprise. Hartford, Steffins, 1869.

Evangeical Magazine, 1812.

Faust, Albert S., *The German Element in the United States.* New York, Steuben Society of America, 1927.

Flint, Charles L., A Hundred Years' Progress of American Agriculture, *19th Annual Report*, Maine Board of Agriculture, 1872.

Ford, A. C., Colonial Precedents of our National Land System as it existed in 1800. Wisconsin University *Bulletin*, History Series, II, No. 2, (1910).

Gordon, Thomas F., *The History of Pennsylvania From its Discovery by Europeans to the Declaration of Independence in 1776.* Philadelphia, 1829.

Greeley, Horace, and others, *The Great Industries of the United States.* Hartford, J. B. Burr and Hyde, 1873.

Grittinger, Henry C., Cornwall Furnace and the Cornwall Ore Banks or Mine Hills. Lebanon County Historical Society *Papers*, II, No. 1, (1901).

Grittinger, Henry C., The Iron Industries of Lebanon County. Lebanon County Historical Society *Papers*, III, No. 1, (1905).

Grumbine, Lee L., The Origin and Significance of Our Township Names. Lebanon County Historical Society *Papers*, I, No. 7, (1898).

Hanna, Mary M., *Trade of the Delaware District Before the Revolution*. Smith College Studies in History, II, (1917).

Hansen, Alvin H., Wholesale Prices in the United States, 1801-1840. *American Statistical Quarterly Publications*, XIV, (1914-1915).

Hayward, W. J., Early western Pennsylvania Agriculture. *Western Pennsylvania* Historical Magazine, VI, (1923).

Hazard, Samuel, *Annals of Pennsylvania from the Discovery of the Delaware, 1609-1682*. Philadelphia, Hazard and Mitchell, 1850.

Hazard, Samuel, ed., *Register of Pennsylvania*. 16 volumes. Philadelphia, Hazard, 1828-1836.

Heilman, Henry S., The Mills of the Quittapahilla. Lebanon County Historical *Papers*, II, No. 10, (1903).

Herrick, Cheesman A., *White Servitude in Pennsylvania: Indentured and Redemption Labor in Colony and Commonwealth*. Philadelphia, J. J. McVey, 1926.

Hess, Abram, The Life and Services of General John Philip de Haas. Lebanon County Historical Society *Papers*, VII, No. 2, (1916).

Hickok, William O. IV., Iron Ores of Pennsylvania. *The Undeveloped Mineral Resources of Pennsylvania*. Pennsylvania Geological Survey. Fourth Series. Harrisburg, 1933.

Hirsh, Monroe B., Early Jewish Colony in Lancaster County. Lancaster County Historical Society *Papers*, V, (1901).

Hutchinson, William T., *Cyrus Hall McCormick: Seed Time*, 1809-1856. New York, Century Co., 1931.

Invilliers, E. V. de, The Cornwall Iron Ore Mines, Lebanon County, Pa., *Transactions* of the American Institute of Mining Engineers, 1886.

James, Henry F., *The Agricultural Industry of Southeastern Pennsylvania, Philadelphia*, 1928.

Jenkins, Howard M., *Pennsylvania: Colonial and Federal. A History, 1608-1903*. 3 volumes. Philadelphia, 1903.

Johnson, George F., *Agriculture in Pennsylvania: A Study of Trends*, County and State, *Since 1840*. Harrisburg, Pennsylvania Department of Agriculture, 1929. Bulletin No. 484.

Johnson, Walter R., *Notes on the Use of Anthracite in the Manufacture of Iron*. Boston, 1841.

Kirkland, Edward C., *A History of American Economic Life*. New York, F. S. Crofts, 1939.

Klein, H. M. J., ed., *Lancaster County, Pa., A History*. 4 volumes. New York and Chicago, Lewis Hist. Pub. Co., 1924.

Klein, Theodore B., *The Canals of Pennsylvania and the System of Internal Improvements*. Harrisburg, Ray, 1901.

Knauss, James O., *Social Conditions among the Pennsylvania Germans in the Eighteenth Century*. Lancaster, New Era Printing Co., 1922.

Krall, J. M., Colonial Events: Eastern Pennsylvania and Schaefferstown, Lebanon County Historical Society *Papers*, II, No. 3, (1901).

Kuhlman, Charles B., *The Development of the Flour-Milling Industry in the United States*. Boston, Houghton Mifflin, 1929.

Learned, Marion D., *The German Barn in America.* University of Pennsylvania Lectures, 1913-1914. University of Pennsylvania Bulletin, 15th Series, No. 3.

Learned, Marion D., The Pennsylvania-German and His English and Scotch-Irish Neighbors, Lebanon County Historical Society *Papers*, II, No. 11, (1903).

Livingood, James W., The Economic History of the Union Canal, *Berks County Historical Review*, III, (1938).

Lord, Eleanor L., *Industrial Experiments in the British Colonies of North America.* John Hopkins University Studies in Historical and Political Science. Extra volume XVII. Baltimore, 1898.

Luetscher, G. D., Industries of Pennsylvania After the Adoption of the Federal Constitution With Special Reference to Lancaster and York Counties, *German-American* Annals, March, 1903, New Series, volume I, No. 3; Old Series, volume V, No. 3.

MacFarlane, John J., *Manufacturing in Philadelphia*, 1683-1912. Philadelphia, Commercial Museum, 1912.

Mann, William J., *Life and Times of Henry Melchoir Muhlenberg.* Philadelphia, 1887.

Mays, George, The Palatine and Scotch-Irish Settlers of Lebanon County, Lebanon County Historical Society *Papers*, I, No. 5, (1900).

Mercer, H. C., *The Bible in Iron or Pictured Stoves and Stove Plates of the Pennsylvania-Germans.* Doylestown, the Bucks County Historical Society, 1914.

Mercer, H. C., *The Decorated Stove Plates of the Pennsylvania Germans.* Doylestown, The Bucks County Historical Society, 1899.

Meyer, Balthasar H., ed., *History of Transportation in the United States Before 1860.* Washington, D. C., Carnegie Institution of Washington, 1917.

Miller, Benjamin L., *Limestones of Pennsylvania*, Pennsylvania Geological Survey, 4th Series, Bulletin M7. Harrisburg, 1925.

Miller, Daniel, Forty Years in the Printing Office, *Reformed Church Record*, 1899.

Miller, Merritt F., Evolution of Reaping Machines, United State Department of Agriculture. Office of Experiment Stations, *Bulletin*, No. 103, 1902.

Mombert, J. I., *An Authentic History of Lancaster County, Pennsylvania.* Lancaster, Barr and Co., 1869.

Morgan, George H., comp. *Annals of Harrisburg, comprising memoirs, incidents and statistics from the period of its first settlement*, rev. and enl. by L. Frances Morgan Black. Harrisburg, Evangelical Publishing House, 1906.

North, S. N. D., A Century of American Wool Manufacturer, National Association of Wool Manufacturers, *Bulletin*, No. 24, (1894-95).

Olde Ulster: an historical and genealogical magazine. 10 vols. 1905-1914. Especially vol. III, (1907).

Pearse, John B., *A Concise History of the Iron Manufacture of the American Colonies up to the Revolution, and of Pennsylvania until the Present Time.* Philadelphia, Allen, Lane, and Scott, 1876.

Pennsylvania Historical Commission, *Sixth Report*, 1931-1934. Harrisburg, The Historical Commission, 1937.

Pennsylvania Historical Commission, Research Report on Indiantown Gap and vicinity. Typed Copy, 1944.

Pennsylvania Manual, 1929.

Pennsylvania Society of the Colonial Dames of America. Pennsylvania. *Forges and Furnaces in the Province of Pennsylvania.* Philadelphia, Printed for the Society, 1914.

Plummer, Wilbur Co., *The Road Policy of Pennsylvania.* Philadelphia, 1925.

Raymond, R. W., The American Iron Master's Work, *Atlantic Monthly*, XL, (1897).

Richards, H. M. M., Lebanon County in the French and Indian War, Lebanon County Historical Society *Papers*, II, No. 2, (1901).

Richards, H. M. M., The Pennsylvania-German in the Revolutionary War, The Pennsylvania German Society *Proceedings and Addresses*, XVII, (1908).

Roberts, Job, *The Pennsylvania Farmer; Being a Selection From the Most Approved Treaties on Husbandry, Interspersed With Observations and Experiments.* Philadelphia, A. Bartram, 1804.

Rockey, John L., The Eastern Border of Lebanon County, Lebanon County Historical Society *Papers*, III, No. 2, (1903).

Rogin, Leo, *The Introduction of Farm Machinery in its relation to The Productivity of Labor in the Agriculture of the United States During the Nineteenth Century.* Berkeley, California, University of California Press, 1931.

Rupp, I. Daniel, *History of the Counties of Berks and Lebanon.* Lancaster, G. Hills, 1844.

Sanford, Albert H., *The Story of Agriculture in the United States.* New York, D. C. Heath and Co., 1916.

Schmauk, Theodore E., *Old Salem in Lebanon, A History of the Congregation and Town.* Lebanon, Report Publishing Co., 1898.

Schmidt, Louis B., The Westward Movement of the Wheat Growing Industry in the United States, *Iowa Journal of History*, XVIII, (1920).

Shannon, Fred A., *America's Economic Growth.* New York, Macmillan, 1940.

Shay, Ralph S., The History of the Lebanon Valley Railroad, Lebanon County Historical Society *Papers*, XI, No. 6, (1942).

Shenk, H. H., Lancaster County Petitions, Etc., To the Supreme Executive Council 1784-1790, Lancaster County Historical Society *Papers*, XXV, No. 5, (1921).

Shenk, H. H., *A History of the Lebanon Valley in Pennsylvania.* 2 vols. Harrisburg, National Historical Press, 1930.

Shepherd, William R., The Land System of Provincial Pennsylvania, American Historical Association *Report* for 1895.

Struble, George G., The English of the Pennsylvania German, *American Speech*, X, No. 3, (1935).

Swank, James M., *History of the Manufacture of Iron in All Ages, and Particularly in the United States from Colonial Times to 1891.* Philadelphia, The American Iron and Steel Association, 2nd edition, 1892.

Swank, James M., *Introduction to a History of Ironmaking and Coal Mining in Pennsylvania.* Philadelphia, The Author, 1878.

Swank, James M., *Progressive Pennsylvania.* Philadelphia, J. B. Lippincott, 1908.

Trego, Charlees B., *Geography of Pennsylvania.* Philadelphia, 1843.

True, Rodney H., Beginnings of Agricultural Literature in America, *American Library Association Bulletin*, XIV, (1920).

True, Rodney H., The Early Development of Agricultural Societies in the United States, American Historical Association *Reports*, 1920.

Tryon, Rolla M., *Household Manufactures in the United States, 1640-1860; a study in Industrial History.* Chicago, University of Chicago Press, 1917.

Ware, Norman, *The Industrial Worker, 1840-1860. The Reaction of American Industrial Society to the Advance of the Industrial Revolution.* Boston, Houghton Mifflin, 1924.

Watson, John F., *Annals of Philadelphia and Pennsylvania.* 3 vols. Philadelphia, 1881.

Watts, Hon. Frederick, The Pennsylvania Barn, *Report* of the Commissioner of Agriculture for the Year 1864. Washington, 1865.

Weeks, Lyman H., *A History of Paper Manufacturing in the United States.* New York, The Lockwood trade journal co., 1916.

Wheeler, George, The Union Canal and its Relation to Philadelphia, Philadelphia City Historical Society *Publications*, IV, (1939).

Wheeler, George, Annals of the Swatara, *The West Schuylkill and Pine Grove* Press, Dec. 22, 1938-May 26, 1939.

Wright, Carroll D., and William C. Hunt, *The History and Growth of the United States Census, Prepared for the Senate Committee on the Census.* Washington, Government Printing Office, 1900.

Zerbe, C. M., Annals of Schaefferstown, Lebanon County Historical Society *Papers*, IV, No. 10, (1908).

Zimmerman, Col. Thomas C., Lebanon, A Bit of Retrospect, Reminiscence and Sentiment, Lebanon County Historical Society *Papers*, I, No. 5, (1898).

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